APPENDIX F: Vegetation Association Descriptions for ZION

(Produced by NatureServe 2001 Western Regional Office (Marion Reid and Keith Schulz)
(Local, Zion Specific Descriptions Written by Julie Thompson)

Plant Associations Table of Contents

I. FOREST

I.A.8.N.c. Conical-crowned temperate or subpolar needle-leaved evergreen forest

I.A.8.N.c.17. ABIES CONCOLOR FOREST ALLIANCE
White Fir Forest Alliance

ABIES CONCOLOR / ACER GRANDIDENTATUM FOREST

White Fir / Bigtooth Maple Forest

ELEMENT CONCEPT

GLOBAL SUMMARY: This forest association has been reported from mountains in Utah, New Mexico and Arizona along the Mogollon Rim. Elevation ranges from 1525-2590 m (5000-8500 feet) This mesic community generally occurs on steep, lower slopes and benches with northern aspects and in narrow canyons and ravines. Soils are generally deep, coarse textured alluvium. *Abies concolor* and *Pseudotsuga menziesii* codominate the upper tree canopy with the subcanopy or tall-shrub layer dominated by *Acer grandidentatum, Quercus gambelii*, and *Acer negundo*. *Pinus strobiformis, Pinus ponderosa, Populus tremuloides*, and *Juglans major* may also be present. The short-shrub layer is variable. The herbaceous layer is moderately dense and may include *Carex siccata (= Carex foenea), Bromus ciliatus var. ciliatus, Bromus ciliatus var. richardsonii (= Bromus richardsonii), Koeleria macrantha, Thalictrum fendleri*, and *Aquilegia chrysantha*. This association transitions to *Abies concolor / Quercus gambelii* Forest (CEGL000261) in the drier uplands and to riparian types adjacent to streams.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at elevations from 5000-8000 feet on steep northern to eastern slopes. It also occurs on other aspects of heavily shaded sites in narrow canyons. Soils are sandy and rapidly drained. Litter cover is high.

Global Environment: This forest association has been reported from mountains in New Mexico and Arizona along the Mogollon Rim, and Utah. Elevation ranges from 1525-2590 m (5000-8500 feet). This mesic community generally occurs on steep, lower slopes and benches with northern aspects and in narrow canyons and ravines. Soils are generally deep, coarse textured alluvium. The association transitions to *Abies concolor / Quercus gambelii* Forest (CEGL000261) in the drier uplands and to riparian types adjacent to streams.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Abies concolor* is well represented in the tree canopy with heights averaging 20-35 m. The subcanopy is dominated by *Acer grandidentatum*. Other species contributing 30-70% total subcanopy and canopy cover may include *Pseudotsuga menziesii, Acer negundo*, and *Quercus gambelii*. There are plots sampled without the presence of *Abies concolor*, with a canopy of *Pseudotsuga menziesii* and other characteristics are the same. The short-shrub layer of *Quercus gambelii* and *Acer grandidentatum* is usually sparse. Subshrubs include *Mahonia repens, Paxistima myrsinites*, and *Symphoricarpos oreophilus*. The herbaceous layer may be diverse, but does not contribute significant ground cover. Common species of the understory are *Thalictrum fendleri, Maianthemum stellatum, Clematis ligusticifolia, Osmorhiza occidentalis*, and *Poa fendleriana*.

Global Vegetation: This mesic forest association is characterized by a mixed-species tree canopy with *Abies concolor* and *Pseudotsuga menziesii* codominating the upper tree canopy with the subcanopy or tall-shrub layer dominated by *Acer grandidentatum, Quercus gambelii*, and *Acer negundo*. *Pinus strobiformis, Pinus ponderosa, Populus tremuloides*, and *Juglans major* may also be present. The short-shrub layer is variable. The herbaceous layer is moderately dense and may include *Carex siccata (= Carex foenea), Bromus ciliatus, Bromus ciliatus var. richardsonii (= Bromus richardsonii), Koeleria macrantha, Thalictrum fendleri*, and *Aquilegia chrysantha*.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Abies concolor, Acer grandidentatum, Pseudotsuga menziesii*
TALL SHRUB	*Acer grandidentatum, Quercus gambelii*

Global

Stratum	Species
TREE CANOPY	*Abies concolor, Acer grandidentatum, Quercus gambelii*
TALL SHRUB	*Acer grandidentatum, Quercus gambelii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Abies concolor, Acer grandidentatum*
TALL SHRUB	*Acer grandidentatum, Quercus gambelii*

Global

Stratum	Species
TREE CANOPY	*Abies concolor, Acer grandidentatum*
TALL SHRUB	*Acer grandidentatum*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G4.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs in Zion National Park's high-elevation narrow canyons and ravines. It has been documented specifically in Kolob Canyons and tributaries of Zion Canyon's Virgin River. It likely recurs in steep canyon crevices throughout the park that are not easily observable or accessible.

Global Range: This forest association has been reported from mountains in New Mexico, Arizona and Utah.

Nations: US

States/Provinces: AZ NM UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH27, 7, 24, 28, 37, 70, 104, 148, 363, 511
Classification Confidence: 2 **Identifier:** CEGL000241
REFERENCES: Alexander et al. 1984a, Alexander et al. 1987, Bourgeron and Engelking 1994, Driscoll et al. 1984, Fitzhugh et al. 1987, Moir and Ludwig 1979, Muldavin et al. 1996, Stuever and Hayden 1997b

ABIES CONCOLOR / ARCTOSTAPHYLOS PATULA FOREST

White Fir / Greenleaf Manzanita Forest

ELEMENT CONCEPT

GLOBAL SUMMARY: This woodland association has been reported from mountains and plateaus in southwestern Utah. Elevation ranges from 2390-2680 m (7840-8880 feet). Stands occur on a variety of sites including steep to gentle, middle to lower slopes and benches. Typically sites are relatively cool with northerly aspects common. Substrates are typically loamy soils derived from limestone parent materials. This association is characterized by an uneven-aged, open to moderately dense tree canopy that is dominated or codominated by *Abies concolor*. Codominants are *Pinus ponderosa* or *Pseudotsuga menziesii*. Dense patches of *Arctostaphylos patula* dominate the open to moderately dense shrub layer. Other shrub species present may include *Paxistima myrsinites, Symphoricarpos oreophilus, Mahonia repens, Ceanothus* spp., *Juniperus communis, Ribes cereum*, and *Purshia tridentata*. The herbaceous cover is sparse (<20% cover) and is primarily composed of graminoids with scattered forbs.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at 7700 feet on a steep north-facing slope of Timber Top Mountain. Soil texture is sandy loam with high litter/duff cover.

Global Environment: This woodland association has been reported from mountains and plateaus in southwestern Utah. Elevation ranges from 2390-2680 m (7840-8880 feet). Stands occur on a variety of sites including steep to gentle, middle to lower slopes and benches. Sites are relatively cool, often with northerly aspects common, but warmer than sites dominated by more mesic understory species such as *Symphoricarpos oreophilus* or *Mahonia repens*. Substrates range from sandy to silty loams that are typically derived from limestone parent materials. Bare soil averages 21% cover, but may be much higher (10-80% cover). Litter cover is generally patchy.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association is uncommon in Zion National Park and likely occurs infrequently beyond the documented site. *Abies concolor* is present with 5% cover. *Pseudotsuga menziesii* and *Pinus ponderosa* are also present and are more abundant than their codominant *Abies concolor*. Canopy height is over 20 m with a subcanopy height of 2-10 m. Regeneration of *Pseudotsuga menziesii* is significant. At less than 2 m in height are shrubs *Arctostaphylos patula, Symphoricarpos oreophilus, Paxistima myrsinites* and the above-listed tree seedlings, together contributing 30% cover. Herbaceous species contribute insignificant cover.

Global Vegetation: This association is characterized by an uneven-aged, open to moderately dense tree canopy that is dominated or codominated by *Abies concolor*. Codominants are *Pinus ponderosa* or *Pseudotsuga menziesii*. Scattered *Juniperus scopulorum* or *Pinus flexilis* trees may also be present. Dense patches of *Arctostaphylos patula* dominate the open to moderately dense shrub layer. Other shrub species present may include *Paxistima myrsinites, Symphoricarpos oreophilus, Mahonia repens, Ceanothus* spp., *Juniperus communis, Ribes cereum*, and *Purshia tridentata*. The herbaceous cover is sparse (<20% cover) and is primarily composed of graminoids with scattered forbs. Common species include *Carex rossii, Achnatherum hymenoides, Elymus elymoides, Poa fendleriana, Achillea millefolium, Astragalus miser, Packera multilobata (= Senecio multilobatus)*, and *Frasera speciosa (= Swertia radiata)*.

Global Dynamics: These woodlands are thought to have longer fire-return intervals than other woodlands with *Arctostaphylos patula*-dominated understories. This is presumably due to the presence of *Abies concolor* and *Pseudotsuga menziesii* trees, which are both sensitive to fires when young (Roberts et al. 1992). The occurrence of a moderate-intensity fire would likely change the composition of individual stands, favoring the more resistant *Pinus ponderosa* and larger trees while killing small to intermediate *Abies concolor* and *Pseudotsuga menziesii* trees, which are less fire-resistant (Roberts et al. 1992). *Arctostaphylos patula* generally increases after fire (Roberts et al. 1992).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Abies concolor, Pinus ponderosa, Pseudotsuga menziesii*
TALL SHRUB	*Arctostaphylos patula, Paxistima myrsinites, Symphoricarpos oreophilus*

Global

Stratum	Species
TREE CANOPY	*Abies concolor, Pinus ponderosa, Pseudotsuga menziesii*
SHORT SHRUB	*Arctostaphylos patula, Juniperus communis, Mahonia repens, Paxistima myrsinites, Symphoricarpos oreophilus*
GRAMINOID	*Carex rossii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Abies concolor, Pinus ponderosa, Pseudotsuga menziesii*
TALL SHRUB	*Arctostaphylos patula, Paxistima myrsinites, Symphoricarpos oreophilus*

Global

Stratum	Species
TREE CANOPY	*Abies concolor, Pinus ponderosa, Pseudotsuga menziesii*
SHORT SHRUB	*Arctostaphylos patula*

GLOBAL SIMILAR ASSOCIATIONS:

- Pseudotsuga menziesii / Arctostaphylos patula Forest (CEGL000423)
- Pinus ponderosa / Arctostaphylos patula Woodland (CEGL000842)
- Abies concolor - Pinus ponderosa / Arctostaphylos patula - Mahonia spp. Forest (CEGL000017)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was documented on Timber Top Mountain located in Kolob Arch quadrangle. It may also occur in small stands on other high mesas.

Global Range: This plant association has been described only in Utah. It ranges across the southern portion of the state from the Pine Valley Mountains, Markagunt, Paunsaugunt, Aquarius plateaus east to the Abajo Mountains.

Nations: US
States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 300
Classification Confidence: 2 **Identifier:** CEGL000242
REFERENCES: Bourgeron and Engelking 1994, Driscoll et al. 1984, Johnston 1987, Roberts et al. 1992, Youngblood and Mauk 1985

ABIES CONCOLOR / QUERCUS GAMBELII FOREST

White Fir / Gambel Oak Forest

ELEMENT CONCEPT

GLOBAL SUMMARY: This forest association has been reported from mountains in New Mexico, Colorado, Utah, and in Arizona along the Mogollon Rim. Elevations range from 1890-2930 m (6200-9600 feet). This community is widespread and often occurs on middle and lower slopes and all aspects except south and southwestern. *Abies concolor* and *Pseudotsuga menziesii* typically codominate the upper tree canopy. *Pinus ponderosa, Pinus strobiformis*, and *Juniperus* spp. may also be present. *Quercus gambelii* dominates the subcanopy and undergrowth. Other shrub species may include *Amelanchier alnifolia, Symphoricarpos oreophilus, Robinia neomexicana*, and *Mahonia repens*. The sparse to moderately dense herbaceous layer is typically composed of *Carex rossii, Poa fendleriana, Lathyrus lanszwertii var. leucanthus (= Lathyrus arizonicus), Thalictrum fendleri*, and *Achillea millefolium*. Stands transition to *Pinus ponderosa / Quercus gambelii* Woodland (CEGL000870) in drier sites.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: Sites with elevations of at least 5500 feet and steep, north- to east-facing slopes are indicative of this association's environmental characteristics. This association also occurs on gently sloping terrain when the elevation is above 7500 feet and thus cooler temperatures. Soils are loamy sands.

Global Environment: This forest association has been reported from mountains in New Mexico, Colorado, Utah, and in Arizona along the Mogollon Rim. Elevations range from 1890-2930 m (6200-9600 feet). This community is widespread and often occurs on middle and lower slopes and all aspects except south and southwestern. Stands transition to *Pinus ponderosa / Quercus gambelii* Woodland (CEGL000870) in drier sites.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association occurs in small stands on shaded colluvial slopes below canyon walls and on high mesas. *Abies concolor* has at least 5% cover. *Pseudotsuga menziesii*, when present, codominates with *A. concolor*. *Pinus ponderosa, Juniperus scopulorum*, and *Quercus gambelii* may also be present in the tree canopy. The prominent shrub *Quercus gambelii* often co-exists with *Symphoricarpos oreophilus* and *Amelanchier utahensis*. The sandy soil is sparsely vegetated with subshrubs *Mahonia repens* and *Paxistima myrsinites,* and has high litter cover.

Global Vegetation: *Abies concolor* and *Pseudotsuga menziesii* typically codominate the upper tree canopy. *Pinus ponderosa, Pinus strobiformis*, and *Juniperus* spp. may also be present. *Quercus gambelii* dominates the subcanopy and undergrowth. Other shrub species may include *Amelanchier alnifolia, Symphoricarpos oreophilus, Robinia neomexicana*, and *Mahonia repens*. The sparse to moderately dense herbaceous layer is composed of *Carex rossii, Poa fendleriana, Bromus* spp., *Lathyrus lanszwertii var. leucanthus (= Lathyrus arizonicus), Thalictrum fendleri*, and *Achillea millefolium*.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Abies concolor, Juniperus scopulorum, Pinus ponderosa, Pseudotsuga menziesii, Quercus gambelii*
TALL SHRUB	*Amelanchier utahensis, Quercus gambelii, Symphoricarpos oreophilus*
SHORT SHRUB	*Mahonia repens, Paxistima myrsinites*
GRAMINOID	*Poa fendleriana*

Global

Stratum	Species
TREE CANOPY	*Abies concolor*
TALL SHRUB	*Quercus gambelii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Abies concolor, Juniperus scopulorum, Pseudotsuga menziesii, Quercus gambelii*
TALL SHRUB	*Quercus gambelii*
SHORT SHRUB	*Mahonia repens, Paxistima myrsinites*

Global

Stratum	Species
TREE CANOPY	*Abies concolor*
TALL SHRUB	*Quercus gambelii*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.
Global Comments: Note that this association does not include *Acer grandidentatum*.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occupies high elevations in the northern half of the park.

Global Range: This forest association has been reported from mountains in New Mexico, Colorado, Utah, and in Arizona along the Mogollon Rim.

Nations: US
States/Provinces: AZ CO NM UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH19, 147, 200, 361.
Classification Confidence: 1 **Identifier:** CEGL000261
REFERENCES: Alexander et al. 1984a, Alexander et al. 1987, Bourgeron and Engelking 1994, DeVelice 1983, DeVelice and Ludwig 1983a, DeVelice et al. 1986, Driscoll et al. 1984, Fitzhugh et al. 1987, Johnston 1984, Johnston 1987, Larson and Moir 1987, Madany and West 1984, Moir and Ludwig 1979, Muldavin et al. 1996, Youngblood and Mauk 1985

ABIES CONCOLOR / SYMPHORICARPOS OREOPHILUS FOREST

White Fir / Mountain Snowberry Forest

ELEMENT CONCEPT

GLOBAL SUMMARY: This forest association has been reported from mountains in Colorado, Utah, New Mexico and Arizona along the Mogollon Rim. Elevation ranges from 1740-3200 m (6800-10,500 feet). Stands are found on cool, dry sites often occurring on moderate to steep mid slopes with northern aspects, but they also occur on southern and western slopes at the higher elevations. Parent material often is limestone and Tertiary sandstone. Soil surface textures are sandy loam to loam and contain little gravel. The upper tree canopy is typically dominated by either *Pinus ponderosa* or *Pseudotsuga menziesii* with scattered *Abies concolor*. This association is characterized by the presence of successfully reproducing *Abies concolor*, which may also dominate or codominate the tree canopy or shrub layers. Associated trees include *Pinus flexilis, Populus angustifolia*, and *Populus tremuloides*. The sparse to moderately dense short-shrub layer is characteristically dominated by *Symphoricarpos oreophilus* often with *Rosa woodsii, Amelanchier alnifolia*, or several other shrubs present. The herbaceous layer is sparse. Common graminoids are *Carex rossii* and *Poa fendleriana*. Forbs are noticeably sparse.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on flat to gently sloping terrain above 7000 feet on loamy or clay loam soils.

Global Environment: This coniferous forest association has been reported from mountains in New Mexico and Arizona along the Mogollon Rim, Colorado and Utah. Elevation ranges from 1740-3200 m (6800-10,500 feet). Stands are found on cool, dry sites often occurring on moderate to steep mid slopes with northern aspects, but they also occur on southern and western slopes at the higher elevations. Parent material often is limestone and Tertiary sandstone. Soil surface textures are sandy loam to loam and contain little gravel. Litter depth averages 2.5 cm. Bare soil averages 7% and exposed rock averages 3%.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Stands of *Abies concolor / Symphoricarpos oreophilus* occur sporadically throughout the white fir forests of the Upper Kolob Plateau. Mature *Abies concolor* dominates the tree canopy with greater than 50% cover and heights of 20 m. When the canopy is nearly closed, *Symphoricarpos oreophilus* is less dense, 10-20%. Other shrubs present with minimal cover are *Prunus virginiana, Amelanchier utahensis, Amelanchier alnifolia*, and *Quercus gambelii*. Open canopies have dense shrub cover with *Symphoricarpos oreophilus* dominating. Herbaceous cover is sparse.

Global Vegetation: Stands have a moderately dense to dense, evergreen needleleaf tree canopy typically dominated by either *Pseudotsuga menziesii* or *Pinus ponderosa* with scattered *Abies concolor*. This association is characterized by the presence of successfully reproducing *Abies concolor*, which may also dominate or codominate the tree canopy or shrub layers. Associated trees, including *Pinus flexilis, Pinus aristata, Populus angustifolia*, and *Populus tremuloides*, may also be present. The sparse to moderately dense short-shrub layer is dominated or codominated by *Symphoricarpos oreophilus* often with *Rosa woodsii, Amelanchier alnifolia*, or several other shrubs present including *Acer glabrum, Amelanchier utahensis, Jamesia americana, Juniperus communis, Mahonia repens, Physocarpus monogynus, Prunus virginiana, Quercus gambelii*, or *Ribes cereum*. The herbaceous layer is sparse. Common graminoids are *Carex rossii* and *Poa fendleriana*. Forbs are noticeably sparse, but may include *Balsamorhiza sagittata, Eriogonum racemosum, Lathyrus lanszwertii*, or *Thalictrum fendleri*.

Global Dynamics: The parasitic dwarf mistletoe *Arceuthobium douglasii* is relatively severe on the branches of *Pseudotsuga menziesii* in this association.

Abies concolor becomes increasingly more resistant to fire with age, and its cover value therefore increases in later seral stands. *Pseudotsuga menziesii* and *Pinus ponderosa* are favored in early seral stands because they are able to establish on open sites and are fire-resistant and, therefore, show a greater cover value. Steuver and Hayden (1987) described 2 phases: a *Pinus ponderosa* phase and a *Pinus flexilis* phase where these seral trees species are an important part of the tree canopy.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Abies concolor*
TALL SHRUB	*Amelanchier utahensis, Symphoricarpos oreophilus*

Global

Stratum	Species
TREE CANOPY	*Abies concolor, Pinus ponderosa, Pseudotsuga menziesii*
SHORT SHRUB	*Amelanchier alnifolia, Rosa woodsii, Symphoricarpos oreophilus*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Abies concolor*
TALL SHRUB	*Amelanchier utahensis, Prunus virginiana, Symphoricarpos oreophilus*

Global

Stratum	Species
TREE CANOPY	*Abies concolor*
SHORT SHRUB	*Symphoricarpos oreophilus*

GLOBAL SIMILAR ASSOCIATIONS:

- Abies concolor - Pseudotsuga menziesii / Erigeron eximius Forest (CEGL000247)
- Pinus ponderosa / Symphoricarpos oreophilus Forest (CEGL000205)
- Pseudotsuga menziesii / Symphoricarpos oreophilus Forest (CEGL000462)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: Two similar associations, *Abies concolor*/*Erigeron eximius* and *Abies concolor*/Sparse, are described by DeVelice et al. (1986) for northern New Mexico and southern Colorado.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on the Upper Kolob Plateau, the northern most boundary of Zion National Park.

Global Range: This coniferous forest association has been reported from mountains in New Mexico, Colorado, Utah, and in Arizona along the Mogollon Rim.

Nations: US
States/Provinces: AZ CO? NM UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH07, 88, 119
Classification Confidence: 1 **Identifier:** CEGL000263
REFERENCES: Bourgeron and Engelking 1994, DeVelice et al. 1986, Driscoll et al. 1984, Edwards 1987, Freeman and Dick-Peddie 1970, Johnston 1984, Johnston 1987, Lamb 1975, Larson and Moir 1987, Roberts et al. 1992, Stuever and Hayden 1997b, Youngblood and Mauk 1985

I.A.8.N.c.22. PSEUDOTSUGA MENZIESII FOREST ALLIANCE

Douglas-fir Forest Alliance

PSEUDOTSUGA MENZIESII / QUERCUS GAMBELII FOREST

Douglas-fir / Gambel Oak Forest

ELEMENT CONCEPT

GLOBAL SUMMARY: This forest association occurs on mountains and plateaus from Colorado to Trans-Pecos Texas, west into Arizona and Utah. Elevation ranges from 1370-2870 m (4500-9400 feet). Stands are found along drainages, lower and middle slopes, steep upper slopes and ridgetops. Aspects are variable. This forest occurs as both a non-obligate riparian community on the outer margins of riparian areas in desert canyons and steep draws, and as an upland forest forming extensive stands on typically north-facing hillslopes (southern aspects at higher elevations). Soils vary, but are often shallow and rocky ranging from sandy loams to clay. The vegetation is characterized by a relatively sparse to moderately dense evergreen tree canopy dominated by *Pseudotsuga menziesii* sometimes with scattered large *Pinus ponderosa, Pinus strobiformis, Pinus edulis*, or *Juniperus* spp. (especially on drier sites). *Abies concolor* is typically not present. *Quercus gambelii* dominates both the subcanopy (tree form, if present) and the moderately dense tall-shrub layer that consists of dense clumps of oak. *Quercus gambelii* must have at least 5% cover, but there is frequently over 25%. At higher elevations, the *Quercus gambelii* are more tree-like and *Symphoricarpos oreophilus* will be present with significant cover in the short-shrub layer. At lower elevations, scattered *Pinus edulis, Juniperus osteosperma*, or *Juniperus deppeana* are often present. The herbaceous layer is generally sparse and composed of mostly graminoids with scattered forbs, but can be moderately dense and diverse. Many other species are associated such as *Amelanchier* spp., *Holodiscus dumosus, Mahonia repens, Paxistima myrsinites, Robinia neomexicana, Rosa woodsii, Carex* spp., *Festuca arizonica, Muhlenbergia virescens, Poa fendleriana, Lathyrus lanszwertii var. leucanthus, Thalictrum fendleri*, and *Vicia americana*. The shrub layer has equal or greater cover than graminoids.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association is dependent on cool and shady environmental conditions. Small stands occur on moderate to steep slopes of shaded stream terraces and slopes that receive minimal solar radiation at lower elevations. At higher elevations, this association occurs on north-facing slopes off mesas and ridges. Elevations for these sites range from 4500 to 7000 feet. Soils are very sandy and have high litter cover.

Global Environment: This forest association occurs on mountains and plateaus from Colorado to Trans-Pecos Texas, west to Arizona and Utah. Elevation ranges from 1370-2870 m (4500-9400 feet). Stands are found along drainages, gentle to moderate lower and middle slopes, steep upper slopes and ridgetops. Aspects are variable. This forest occurs as both a non-obligate riparian community on the outer margins of riparian areas in desert canyons and steep draws, and as an upland forest forming extensive stands on typically north-facing hillslopes (southern aspects at higher elevations). Soils vary, but are often shallow and rocky ranging from sandy loams to clay. The surface is generally largely covered with a thin layer of litter. Parent materials include fractured limestone, sandstone, basalt and andesite.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Pseudotsuga menziesii* is the prominent species in the canopy layer represented by few to several mature trees. Mature *Juniperus scopulorum* are likely to be present or represented in the subcanopy by young trees and seedlings. *Abies concolor* is present at one documented site. The subcanopy is dominated by *Quercus gambelii* in tree form. The canopy and subcanopy species combined provide high foliar cover. The less dense shrub layer is composed of *Acer grandidentatum* and *Quercus gambelii* and subshrubs *Paxistima myrsinites* and *Mahonia repens*. Herbaceous cover is sparse and commonly represented by mesic forest species *Maianthemum stellatum, Thalictrum fendleri*, and *Pteridium aquilinum*.

Global Vegetation: This association is characterized by a relatively sparse to moderately dense evergreen tree canopy dominated by *Pseudotsuga menziesii* sometimes with scattered large *Pinus ponderosa, Pinus strobiformis, Pinus edulis*, or *Juniperus* spp. (especially on drier sites). *Abies concolor* is typically not present. *Quercus gambelii* dominates both the subcanopy (tree form, if present) and the moderately dense tall-shrub layer that consists of dense clumps of oak. *Quercus gambelii* must have at least 5% cover, but there is frequently over 25%. At higher

elevations, the *Quercus gambelii* are more tree-like and *Symphoricarpos oreophilus* will be present with significant cover in the short-shrub layer. At lower elevations, scattered *Pinus edulis, Juniperus osteosperma*, or *Juniperus deppeana* are often present. Other common shrub species depending on range may include *Acer glabrum, Arctostaphylos patula, Amelanchier* spp., *Cercocarpus montanus, Holodiscus dumosus, Mahonia repens, Paxistima myrsinites, Prunus virginiana, Ribes cereum, Robinia neomexicana*, and *Rosa woodsii*. The generally sparse herbaceous layer is composed of mostly graminoids with scattered forbs, but ranges to moderately dense and diverse. Associated graminoids may include *Bromus* spp., *Carex rossii, Festuca arizonica, Koeleria macrantha, Muhlenbergia montana, Muhlenbergia virescens*, and *Poa fendleriana*. Common forbs include *Achillea millefolium, Lathyrus lanszwertii var. leucanthus, Thalictrum fendleri*, and *Vicia americana*. The shrub layer has equal or greater cover than graminoids. This open conifer forest transitions to *Quercus gambelii* woodlands in drier sites and at lower elevations.

Global Dynamics: This association represents mid- to late-seral forests that are dominated by *Pseudotsuga menziesii* with the diagnostic *Quercus gambelii*-dominated understory. Large, often fire-scarred *Pinus ponderosa* trees may be present to codominant in the canopy, but do not reproduce (Alexander et al. 1984, DeVelice et al. 1986).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Acer grandidentatum, Pseudotsuga menziesii, Quercus gambelii*
TALL SHRUB	*Quercus gambelii*
SHORT SHRUB	*Mahonia repens, Paxistima myrsinites*
FORB	*Maianthemum stellatum, Thalictrum fendleri*

Global

Stratum	Species
TREE CANOPY	*Pinus ponderosa, Pinus strobiformis, Pseudotsuga menziesii*
TALL SHRUB	*Quercus gambelii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus scopulorum, Pseudotsuga menziesii*
TALL SHRUB	*Acer grandidentatum, Quercus gambelii*
SHORT SHRUB	*Mahonia repens, Paxistima myrsinites*
FORB	*Maianthemum stellatum*
FERN	*Pteridium aquilinum*

Global

Stratum	Species
TREE CANOPY	*Pseudotsuga menziesii*
TALL SHRUB	*Quercus gambelii*

GLOBAL SIMILAR ASSOCIATIONS:

- Abies concolor / Quercus gambelii Forest (CEGL000261)
- Pinus ponderosa / Quercus gambelii Woodland (CEGL000870)
- Pseudotsuga menziesii / Holodiscus discolor Forest (CEGL000437)
- Pseudotsuga menziesii / Festuca arizonica Forest (CEGL000433)
- Pseudotsuga menziesii / Muhlenbergia virescens Forest (CEGL000444)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: Within the Habitat Type literature there are four phases mentioned: *Festuca arizonica* phase, *Holodiscus dumosus* phase, *Muhlenbergia virescens* phase (all defined by having at least 5% cover of both *Quercus gambelii* and the nominal species), and *Quercus gambelii* (typic) phase by a undeveloped herbaceous layer (Alexander et al. 1984b, Alexander et al. 1987, DeVelice et al. 1986, Fitzhugh et al. 1987, Johnston 1987, Larson and Moir 1987, Muldavin et al. 1996, Stuever and Hayden 1997b). There are 3 similar USNVC *Pseudotsuga menziesii* associations that use these phase species as the nominal species. These phases represent "intermediate" vegetation. Review of these associations is needed to clarify relationships between associations.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs in shady narrow canyons and high slopes of mesas in Temple of Sinawava and Guardian Angels quadrangles.

Global Range: This *Pseudotsuga menziesii* forest association occurs in the southern Rocky Mountains and southwestern U.S. and is found on foothills, mountains and plateaus from Colorado to Trans-Pecos Texas, west to Arizona and Utah.

Nations: US
States/Provinces: AZ CO NM TX UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 54, 205, 526, 313
Classification Confidence: 2 **Identifier:** CEGL000452
REFERENCES: Alexander et al. 1984b, Alexander et al. 1987, Bader 1932, Blackhawk Coal Company 1981, Bourgeron and Engelking 1994, Bourgeron et al. 1993b, DeVelice et al. 1986, Diamond 1993, Fitzhugh et al. 1987, Freeman and Dick-Peddie 1970, Hess and Wasser 1982, Johnston 1987, Keammerer 1974b, Kittel et al. 1994, Kittel et al. 1999, Komarkova et al. 1988a, Larson and Moir 1987, Muldavin et al. 1996, Stuever and Hayden 1997b, Tiedemann and Terwilliger 1978, Youngblood and Mauk 1985

PSEUDOTSUGA MENZIESII / SYMPHORICARPOS OREOPHILUS FOREST

Douglas-fir / Mountain Snowberry Forest

ELEMENT CONCEPT

GLOBAL SUMMARY: This widespread forest association occurs in foothills, mountains and plateaus from southwestern Montana to Trans-Pecos Texas, west to Arizona, Utah, and into eastern Oregon and Washington. Elevation ranges from 700-2870 m (2310-9400 feet). This broadly defined forest association occurs as both a non-obligate riparian community and as an upland community. In more arid regions stands occur along drainages along narrow riparian areas in ravines, canyons, and up steep draws. It continues upland on steep north-facing slopes in narrow canyons where dense shade and steepness preclude any significant shrub or herbaceous understory. Elsewhere at more northern latitudes, it occurs near lower treeline on warm, dry southern aspects with moderate to very steep mid- and upper slopes and ridges. Soils are variable, and range from deep silt loam, to shallow, rocky substrates. Some stands have high rock cover. The vegetation is characterized by a relatively sparse to dense evergreen tree canopy dominated by *Pseudotsuga menziesii* sometimes with scattered large *Pinus ponderosa, Pinus flexilis, Populus tremuloides, Juniperus scopulorum*, or *Juniperus occidentalis*, especially on drier sites. *Abies concolor* is typically not present. *Symphoricarpos oreophilus* dominates the sparse to moderately dense short-shrub layer. Shrub associates vary depending on range and habitat and may include *Acer glabrum, Amelanchier* spp., *Artemisia tridentata ssp. vaseyana, Cercocarpus montanus, Holodiscus dumosus, Juniperus communis, Mahonia repens, Paxistima myrsinites, Prunus virginiana, Quercus gambelii, Ribes cereum, Ribes inerme, Rosa woodsii*, or *Shepherdia canadensis*. The generally sparse herbaceous layer is composed of mostly graminoids with scattered forbs.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association was sampled on two north-facing mesa rims at 7000 feet. The site sampled in Zion Canyon is at an elevation of 4500 feet on a steep northeast-facing colluvial slope. Soil texture ranges from sandy loam to clay loam.

Global Environment: This widespread forest association occurs in foothills, mountains and plateaus from southwestern Montana to Trans-Pecos Texas, west to Arizona, Utah, and into eastern Oregon and Washington. Elevation ranges from 700-2870 m (2310-9400 feet). This broadly defined forest association occurs as both a non-obligate riparian community and as an upland community. In more arid regions stands occur along drainages along narrow riparian areas in ravines, canyons, and up steep draws. It continues upland on steep north-facing slopes in narrow canyons where dense shade and steepness preclude any significant shrub or herbaceous understory. Elsewhere at more northern latitudes, it occurs near lower treeline on warm, dry southern aspects on moderate to very steep mid- and upper slopes and ridges. Soils are variable, and range from deep silt loam, to shallow, rocky substrates. Parent materials are also variable and may include colluvium or residuum derived from calcareous shale, sandstone, granite, limestone, rhyolite and basalt. Some stands have high rock cover.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association is dominated by mature *Pseudotsuga menziesii* with cover of 40-60% and heights 20-35 m. *Pinus ponderosa* and/or *Abies concolor* are occasionally present, but with less cover than *Pseudotsuga menziesii*. The indicator shrub *Symphoricarpos oreophilus* is at least present, but with insignificant cover. *Amelanchier utahensis* is usually present in the shrub layer. Herbaceous species are diverse and contribute minimal cover.

Global Vegetation: This forest association is characterized by a relatively sparse to dense evergreen tree canopy dominated by *Pseudotsuga menziesii* sometimes with scattered large *Pinus ponderosa, Pinus flexilis, Populus tremuloides, Juniperus scopulorum*, or *Juniperus occidentalis*, especially on drier sites. *Abies concolor* is typically not present. *Symphoricarpos oreophilus* is present and usually dominates the sparse to moderately dense short-shrub layer. Shrub associates vary depending on range and habitat and may include *Acer glabrum, Amelanchier* spp., *Artemisia tridentata ssp. vaseyana, Cercocarpus montanus, Holodiscus dumosus, Juniperus communis, Mahonia repens, Paxistima myrsinites, Prunus virginiana, Quercus gambelii, Ribes cereum, Ribes inerme, Rosa woodsii*, or *Shepherdia canadensis*. The generally sparse herbaceous layer is composed of mostly graminoids with scattered forbs. Associated graminoids may include *Bromus* spp., *Carex geyeri, Carex rossii, Festuca idahoensis, Leucopoa*

kingii, Koeleria macrantha, and *Poa fendleriana*. Common forbs include *Achillea millefolium, Arnica cordifolia, Artemisia frigida, Thalictrum fendleri*, and *Vicia americana*.

Global Dynamics: This association occurs over a wide range of environmental conditions. Where precipitation and temperature are adequate, it occurs as an upland association. Where it occurs as a riparian forest, it is limited to very narrow canyon bottoms where narrow canyons with steep slopes create pockets of cool, moist air by funneling cold air downwards, thus providing a microsite for *Pseudotsuga menziesii* (Kittel et al. 1999, Kittel et al. 1999b). Often the coarse colluvial substrates provide deep moisture for trees and shrubs but little moisture for herbaceous layer.

Both diagnostic species are tolerant of ground fire. *Pseudotsuga menziesii* develops thick fire-resistant bark with age, and *Symphoricarpos oreophilus* resprouts after burning (Fischer and Bradley 1987, Wright et al. 1979). Ground fires occur at less than 30-year intervals in the Rocky Mountains (Pfister et al. 1977). Fire-return interval can be much less frequent in cool, dry stands in Utah were ground fire is limited by lack of continuous fine fuels or moist forest areas that rarely burn (about every 140 years) (Arno 1980,Youngblood and Mauk, 1985). In many cases, past fire suppression has allowed dense stands to form which provide a continuous fuel ladder to the crown of overstory trees and have increased the potential for severe, stand-destroying wildfires.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Pinus ponderosa, Pseudotsuga menziesii*
TALL SHRUB	*Amelanchier utahensis, Symphoricarpos oreophilus*

Global

Stratum	Species
TREE CANOPY	*Pseudotsuga menziesii*
SHORT SHRUB	*Symphoricarpos oreophilus*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Pinus ponderosa, Pseudotsuga menziesii*
TALL SHRUB	*Amelanchier utahensis, Symphoricarpos oreophilus*

Global

Stratum	Species
TREE CANOPY	*Pseudotsuga menziesii*
SHORT SHRUB	*Symphoricarpos oreophilus*

GLOBAL SIMILAR ASSOCIATIONS:

- Pinus ponderosa / Symphoricarpos oreophilus Forest (CEGL000205)
- Abies concolor / Symphoricarpos oreophilus Forest (CEGL000263)
- Populus tremuloides - Pseudotsuga menziesii / Symphoricarpos oreophilus Forest (CEGL000546)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: This is a broadly defined *Pseudotsuga menziesii* association which includes a variety of stands from different environments that are tied together by a common widespread species, *Symphoricarpos oreophilus*.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is documented at Herb's Point in Kolob Canyons, Big Bend in Zion Canyon and on the mesa north of Wynopits Mesa in Zion National Park.

Global Range: This widespread montane forest association occurs in foothills, mountains and plateaus from southwestern Montana to Trans-Pecos Texas, west to Arizona, Utah, and into eastern Oregon and Washington.

Nations: US
States/Provinces: AZ? CO ID MT NM OR TX UT WA WY

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 254, 273, 14
Classification Confidence: 1 **Identifier:** CEGL000462
REFERENCES: Arno 1980, Bourgeron and Engelking 1994, Diamond 1993, Fischer and Bradley 1987, Hess and Wasser 1982, Johnson and Clausnitzer 1992, Johnson and Simon 1987, Johnston 1987, Kittel et al. 1994, Kittel et al. 1999, Kittel et al. 1999b, Komarkova et al. 1988b, Lillybridge et al. 1995, Mauk and Henderson 1984, Muldavin et al. 1996, Pfister et al. 1977, Reed 1976, Steele et al. 1981, Steele et al. 1983, Williams and Lillybridge 1983, Williams and Lillybridge 1985, Williams et al. 1990b, Wright et al. 1979, Youngblood and Mauk 1985

PSEUDOTSUGA MENZIESII / ACER GRANDIDENTATUM FOREST

Douglas-fir / Bigtooth Maple Forest

ELEMENT CONCEPT

GLOBAL SUMMARY: This forest association has been reported from mountains in south-central New Mexico, southwestern Utah, and Arizona. This forest association has been reported from two locations, the Organ Mountains in New Mexico and Zion NP, Utah. In both areas it generally occurs above 1525 m (5000 ft), and often much higher, in north-facing ravines and canyons. It is a relatively mesic forest due to the north-facing, shaded nature of the sites where it's found. Slopes are steep, but positions on the slopes ranch from canyon bottom to upper slopes. Muldavin et al. (1994) report the soils as deep, and fine textured, while those in Zion NP tend to be coarser and rockier. In obth cases, the litter/duff layer is deep and has high cover. Some stands in Zion NP had a significant component of large rocks on the ground surface. This mesic forest association is characterized by a tree canopy with *Pseudotsuga menziesii* dominating the upper tree canopy with a subcanopy or tall-shrub layer dominated by *Acer grandidentatum. Pinus ponderosa* is present in some stands. Tree canopy cover ranges from 30% to well over 70%, and in Zion NP heights ranged from 15 to 35 m. The short tree / subcanopy layer is quite dense, shading the forest floor. In addition to *Acer granditentatum,* the tall shrub layer has abundant *Quercus gambelii*, and in Zion *Acer negundo* or *Betula occidentalis*. The short-shrub layer may contain *Mahonia repens, Paxistima myrsinites*, or *Symphoricarpos oreophilus*, but is not abundant. The herbaceous layer is typically sparse due to the shading of the woody species. Common species include *Claytonia perfoliata, Maianthemum stellatum, Vitis arizonica , Thalictrum fendleri*, and *Poa fendleriana.*

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at elevations from 4480 - 6400 feet on steep slopes, generally with northern or northwestern aspects. Sites include canyons, and ravines, and in one case the channel bed of a narrow canyon. These are all heavily shaded locations, with mesic conditions due to the northerly aspect and shading. Soils are sandy and rapidly drained, and in some cases rocky. Litter cover is generally high, and in some stands there is substantial cover of downed wood or large rocks on the ground surface.

Global Environment: This forest association has been reported from two locations, the Organ Mountains in New Mexico and Zion NP, Utah. In both areas it generally occurs above 1525 m (5000 ft), and often much higher, in north-facing ravines and canyons. It is a relatively mesic forest due to the north-facing, shaded nature of the sites where it's found. Slopes are steep, but positions on the slopes ranch from canyon bottom to upper slopes. Muldavin et al. (1994) report the soils as deep, and fine textured, while those in Zion NP tend to be coarser and rockier. In obth cases, the litter/duff layer is deep and has high cover. Some stands in Zion NP had a significant component of large rocks on the ground surface.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Pseudotsuga menziesii* is well represented in the tree canopy with heights ranging from 10 to 35 m. *Pinus ponderosa* is present is a few stands, but with low cover. The subcanopy or tall shrub layer is dominated by *Acer grandidentatum*. Other species are common in the subcanopy and tall shrub layers, including *Acer negundo, Quercus gambelii,* and *Betula occidentalis*. The short-shrub layer includes *Quercus gambelii* and *Acer grandidentatum,* is usually somewhat sparse. Subshrubs include *Mahonia repens, Paxistima myrsinites*, and *Symphoricarpos oreophilus*. The herbaceous layer is not particularly diverse, and does not contribute significant ground cover. Common species of the understory are *Claytonia perfoliata, Maianthemum stellatum, Vitis arizonica,* and *Poa fendleriana*.

Global Vegetation: This mesic forest association is characterized by a tree canopy with *Pseudotsuga menziesii* dominating the upper tree canopy with a subcanopy or tall-shrub layer dominated by *Acer grandidentatum. Pinus ponderosa* is present in some stands. Tree canopy cover ranges from 30% to well over 70%, and in Zion NP heights ranged from 15 to 35 m. The short tree / subcanopy layer is quite dense, shading the forest floor. In addition to *Acer granditentatum,* the tall shrub layer has abundant *Quercus gambelii*, and in Zion *Acer negundo* or *Betula occidentalis*. The short-shrub layer may contain *Mahonia repens, Paxistima myrsinites*, or *Symphoricarpos oreophilus*, but is not abundant. The herbaceous layer is typically sparse due to the shading of the woody species. Common species include *Claytonia perfoliata, Maianthemum stellatum, Vitis arizonica , Thalictrum fendleri*, and *Poa fendleriana.*

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Acer grandidentatum, Pseudotsuga menziesii*
TALL SHRUB	*Acer grandidentatum, Quercus gambelii*
SHORT SHRUB	*Mahonia repens, Paxistima myrsinites*
FORB	*Claytonia perfoliata, Maianthemum stellatum*

Global

Stratum	Species
TREE CANOPY	*Acer grandidentatum, Pseudotsuga menziesii*
TALL SHRUB	*Acer grandidentatum, Quercus gambelii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Pseudotsuga menziesii, Acer grandidentatum*
TALL SHRUB	*Acer grandidentatum, Quercus gambelii*

Global

Stratum	Species
TREE CANOPY	*Pseudotsuga menziesii, Acer grandidentatum*
TALL SHRUB	*Acer grandidentatum*

GLOBAL SIMILAR ASSOCIATIONS:
- Abies concolor / Acer grandidentatum Forest (CEGL000241)
- Pseudotsuga menziesii / Quercus gambelii Forest (CEGL000452)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G4

Global Comments: This is a very poorly known and documented association; no reports or studies have been found to document it in Arizona, but ecologists report it occurs there. Further inventory is clearly needed.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs in Zion National Park's high-elevation narrow canyons and ravines. It has been documented specifically in Kolob Canyons and tributaries of Zion Canyon's Virgin River. It likely recurs in steep canyon crevices throughout the park that are not easily observable or accessible.

Global Range: This forest association has been reported from mountains in south-central New Mexico, southwestern Utah, and Arizona.

Nations: US

States/Provinces: AZ:S?, NM:S4, UT:S2?

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 148. AA points: ZION96, ZION.879, ZION.957, ZION.1145, ZION.1255
Classification Confidence: 3 **Identifier:** CEGL000419
REFERENCES: Bourgeron and Engelking 1994, Driscoll et al. 1984, Muldavin et al. 1994a

I.B.2.N.b. Montane or boreal cold-deciduous forest

I.B.2.N.b.1. ACER GRANDIDENTATUM MONTANE FOREST ALLIANCE

Bigtooth Maple Montane Forest Alliance

ACER GRANDIDENTATUM / QUERCUS GAMBELII FOREST

Bigtooth Maple / Gambel Oak Forest

ELEMENT CONCEPT

GLOBAL SUMMARY: This forest association has been reported from mountains and plateaus of Utah. Elevations range from 1220-2620 m. Sites include moderate to steep, middle and lower slopes with cool northern or eastern aspects, intermittently flooded canyon bottoms, alluvial benches, and shaded colluvial slopes. *Acer grandidentatum* and *Quercus gambelii* codominate the tree canopy. The understory is variable and may be dominated by tall or short shrubs. Species include *Prunus virginiana, Rosa woodsii, Symphoricarpos oreophilus, Physocarpus malvaceus, Mahonia repens*, and seedling trees. The herbaceous layer is generally sparse because of heavy shading. Stands transition to *Quercus gambelii* woodland in the drier uplands.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on moderate to steep, northerly and easterly slopes, canyon-shaded colluvial slopes, and ravines at elevations of 4000-8000 feet. Soils are variable, ranging from sand to clay loam.

Global Environment: This forest association occurs in the mountains and plateaus of Utah. Elevations range from 1220-2620 m. Sites include moderate to steep, middle and lower slopes with cool northern or eastern aspects, intermittently flooded canyon bottoms, alluvial benches, and shaded colluvial slopes. These forests typically occur on these relatively mesic sites, especially at lower latitudes and elevations. However, stands have been reported on dry, open slopes in the northern part of its range in the Wasatch Mountains where fire suppression may be allowing oak-dominated stands to succeed to mixed maple-oak. Substrates are generally calcareous and rocky with soil textures ranging from sand to clay loam.

VEGETATION DESCRIPTION

Zion National Park Vegetation: In this association *Acer grandidentatum* cover is frequently over 50% in the tree and shrub layers combined. *Quercus gambelii* is absent to abundant in both the tree and shrub layers and may exceed cover of *Acer grandidentatum*. *Celtis laevigata var. reticulata* may be present in the canopy. Canopy trees average 10-15 m in height and 15 cm dbh. *Juniperus scopulorum* and/or *Pinus ponderosa* occasionally occur in ravines as an emergent tree layer, and contribute 10-30% cover with a dense subcanopy of *Acer grandidentatum* and *Quercus gambelii*. *Symphoricarpos oreophilus* contributes minor cover in the shrub layer, and few other shrubs are present with the *Acer grandidentatum* and *Quercus gambelii*. Herbaceous cover is variable, 5-30%, and most commonly represented by *Pteridium aquilinum, Poa pratensis, Bromus diandrus*, and *Poa fendleriana*.

Global Vegetation: This association is characterized by a moderately dense to dense tree canopy of *Acer grandidentatum* that is typically codominated by *Quercus gambelii*. *Celtis laevigata var. reticulata, Juniperus scopulorum*, or *Juniperus osteosperma* may also be present to abundant. The shrub layer is variable, depending on the stand age, elevation and habitat. It ranges from dense *Quercus gambelii*-dominated tall-shrub stratum to a mixed short-shrub layer that includes *Symphoricarpos oreophilus, Prunus virginiana, Amelanchier utahensis, Mahonia repens, Physocarpus malvaceus, Paxistima myrsinites*, and *Rosa woodsii*. The herbaceous layer is generally sparse because of shading. Associates such as *Elymus glaucus, Poa fendleriana, Heterotheca villosa, Thalictrum fendleri, Carex hoodii, Vicia americana*, and species of *Lathyrus, Osmorhiza, Eriogonum*, and *Polygonum* may be present.

Global Dynamics: This association is closely related to oakbrush types of Utah (*Quercus gambelii*-dominated and codominated communities), sharing many of the same species (Reem 1960, 1964, Kunzler et al. 1981). Kunzler et al. (1981) suggested that the maple stands sampled by Reem (1960, 1964) in the Wasatch Mountains are likely late-seral stages of the oakbrush types.

Quercus gambelii is a fire-adapted rhizomatous shrub that can form dense clones and will vigorously resprout after a burn (FEIS 2001). *Acer grandidentatum* is also rhizomatous, but resprouts much less vigorously after burning, so *Quercus gambelii* is favored by frequent fires (FEIS 2001). However, throughout much of this association's range, stands are restricted to relatively mesic sites such as along streams, shady canyon bottoms, and on cool northern aspects at higher elevations where fire is less frequent. Where stands are more widespread in the northern part of its range in the Wasatch Mountains, *Acer grandidentatum* has recently been invading *Quercus gambelii* stands growing on open slopes with warm aspects. Harper et al. (1985) suggested these drier sites had greater fire frequency prior to fire suppression that favored the more fire-adapted oak. Now with fire suppression, *Acer grandidentatum* has been slowly colonizing these relatively xeric habitats. Research is needed to verify this hypothesis.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Acer grandidentatum, Quercus gambelii*
TALL SHRUB	*Acer grandidentatum, Quercus gambelii, Symphoricarpos oreophilus*
GRAMINOID	*Bromus diandrus, Poa fendleriana, Poa pratensis*

Global

Stratum	Species
TREE CANOPY	*Acer grandidentatum, Juniperus scopulorum, Quercus gambelii*
TALL SHRUB	*Acer grandidentatum, Quercus gambelii*
SHORT SHRUB	*Symphoricarpos oreophilus*
GRAMINOID	*Poa fendleriana*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Acer grandidentatum, Quercus gambelii*
TALL SHRUB	*Acer grandidentatum, Quercus gambelii*

Global

Stratum	Species
TREE CANOPY	*Acer grandidentatum, Quercus gambelii*

OTHER NOTEWORTHY SPECIES

Global

Stratum	Species
GRAMINOID	*Bromus diandrus, Bromus tectorum, Poa pratensis*

GLOBAL SIMILAR ASSOCIATIONS:

- Abies concolor / Acer grandidentatum Forest (CEGL000241)
- Pseudotsuga menziesii / Acer grandidentatum Forest (CEGL000419)
- Acer grandidentatum / Calamagrostis rubescens Forest (CEGL000558)
- Populus angustifolia / Acer grandidentatum Forest (CEGL000646)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G4G5.

Global Comments: *Acer grandidentatum* and *Quercus gambelii* both are widespread western species and occur in the understory of several conifer-dominated associations. There are several similar forest associations that are dominated by *Acer grandidentatum* with one of several oak species codominant or in the understory. Both *Acer grandidentatum* and *Quercus gambelii* have shrub and tree forms which complicate the vegetation classification of this mixed type. This association is typically late seral with some large single- or few-stemmed maples and oaks that are over 5 m tall.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs throughout the park in shaded canyon bottoms, alluvial benches, and high-elevation mountain toeslopes.

Global Range: This forest association is documented from the Wasatch and Uinta ranges in northeastern Utah and the Markagunt Plateau in southwestern Utah.

Nations: US
States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH28, RH66, RH74, 15, 27, 123, 209, 260
Classification Confidence: 2 **Identifier:** CEGL000559
REFERENCES: Allman 1952, Bourgeron and Engelking 1994, Christensen 1955, Driscoll et al. 1984, FEIS 2001, Harper et al. 1985, Kunzler et al. 1981, Ream 1960, Ream 1964

I.B.2.N.b.10. POPULUS TREMULOIDES FOREST ALLIANCE

Quaking Aspen Forest Alliance

POPULUS TREMULOIDES / SYMPHORICARPOS OREOPHILUS / TALL FORBS FOREST

Quaking Aspen / Mountain Snowberry / Tall Forbs Forest

ELEMENT CONCEPT

GLOBAL SUMMARY: This deciduous forest association is widespread in the Intermountain region on the western U.S. It is found at montane and subalpine elevations from 1890-2960 m (6200-9700 feet) across its latitudinal range. Sites include lower slopes and benches, draws, sheltered slopes, and high benches that range from flat to moderate slopes of any aspect. Northern to eastern aspects are common in the drier and warmer environments in the southern portions of its range . Soils are variable but include loams or sandy loams that are often derived from sandstone parent material. The vegetation is characterized by a moderately dense to dense tree canopy of *Populus tremuloides* with a short-shrub layer with at least 10% cover that is dominated by *Symphoricarpos oreophilus*. The herbaceous layer present with at least 10% cover is dominated by tall forbs such as *Agastache urticifolia, Eucephalus engelmannii, Hackelia floribunda, Mertensia arizonica, Osmorhiza occidentalis, Senecio serra*, and *Valeriana occidentalis*. Occasional conifer trees are possible in a stand, but do not make up more than 10% of the tree canopy.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: Stands of *Populus tremuloides / Symphoricarpos oreophilus* occur on flat to gentle slopes with northern to eastern aspects and elevations of 7000 to 8000 feet. Soil texture is loam or sandy loam and entirely covered with vegetation, litter, and downed aspen trees.

Global Environment: This deciduous forest association is widespread in the Intermountain region of the western U.S. It is found at montane and subalpine elevations from 1890-2960 m (6200-9700 feet) across its latitudinal range. Sites include lower slopes and benches, draws, sheltered slopes, and high benches that range from flat to moderate slopes of any aspect. Northern to eastern aspects are common in the drier and warmer environments in the southern portions of its range . Soils are variable, but are generally well-developed, well-drained loams or sandy loams that are often derived from sandstone parent material.

VEGETATION DESCRIPTION

Zion National Park Vegetation: In this association, *Populus tremuloides* may have a cover of 30-60%. Canopy openings and mesic conditions allow lush understory vegetation to exist. *Symphoricarpos oreophilus* has a foliar cover ranging from 10-40% and is always the dominant shrub in this association. *Quercus gambelii, Rosa woodsii*, and *Populus tremuloides* seedlings may also be present but usually contribute less than 5% of woody species cover. Herbaceous cover is variable, but generally dominated by *Poa pratensis* and *Mertensia arizonica*. *Elymus glaucus* and other wheat grasses may also be present as well as exotics.

Global Vegetation: This deciduous forest association is characterized by a moderately dense to dense tree canopy of *Populus tremuloides* with a short-shrub layer with at least 10% (typically 30%) cover that is dominated by *Symphoricarpos oreophilus*. Occasional *Prunus virginiana* or *Amelanchier alnifolia* tall shrubs may be present. Other short shrubs include *Rosa woodsii, Mahonia repens, Paxistima myrsinites*, and *Ceanothus velutinus*. An herbaceous layer present with at least 10% cover is characteristically dominated by tall forbs such as *Agastache urticifolia, Eucephalus engelmannii, Hackelia floribunda, Mertensia arizonica, Osmorhiza occidentalis , Senecio serra*, and *Valeriana occidentalis*. Other forbs may include *Lathyrus* spp., *Geranium viscosissimum, Osmorhiza berteroi (= Osmorhiza chilensis), Rudbeckia occidentalis, Thalictrum fendleri*, and *Vicia americana*. Graminoids may be present and often include taller species like *Bromus carinatus, Elymus glaucus*, and introduced species *Thinopyrum intermedium* or *Poa pratensis*. Occasional conifer trees are possible in stands, but do not make up more than 25% of the tree canopy.

Global Dynamics: These communities can provide good forage for livestock, especially sheep (Mueggler 1988). However, with excessive livestock grazing *Lathyrus* spp., *Rudbeckia occidentalis, Vicia americana*, and *Poa pratensis* will dominate the understory.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Populus tremuloides*
SHRUB	*Symphoricarpos oreophilus*
GRAMINOID	*Elymus glaucus, Elymus repens, Poa pratensis*
FORB	*Achillea millefolium, Agastache urticifolia, Maianthemum stellatum, Mertensia arizonica, Osmorhiza occidentalis, Vicia americana*

Global

Stratum	Species
TREE CANOPY	*Populus tremuloides*
SHORT SHRUB	*Symphoricarpos oreophilus*
GRAMINOID	*Bromus carinatus, Elymus glaucus*
FORB	*Agastache urticifolia, Mertensia arizonica, Osmorhiza berteroi, Rudbeckia occidentalis, Senecio serra, Thalictrum fendleri*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Populus tremuloides*
SHRUB	*Quercus gambelii, Rosa woodsii, Symphoricarpos oreophilus*
GRAMINOID	*Elymus glaucus, Poa pratensis*
FORB	*Maianthemum stellatum, Mertensia arizonica, Vicia americana*

Global

Stratum	Species
TREE CANOPY	*Populus tremuloides*
SHORT SHRUB	*Symphoricarpos oreophilus*
FORB	*Agastache urticifolia, Eucephalus engelmannii, Hackelia floribunda, Mertensia arizonica, Osmorhiza occidentalis, Senecio serra, Valeriana occidentalis*

OTHER NOTEWORTHY SPECIES

Global

Stratum	Species
GRAMINOID	*Elytrigia intermedia, Poa pratensis*

GLOBAL SIMILAR ASSOCIATIONS:

- Populus tremuloides / Amelanchier alnifolia - Symphoricarpos oreophilus / Bromus carinatus Forest (CEGL000566)
- Populus tremuloides / Amelanchier alnifolia - Symphoricarpos oreophilus / Calamagrostis rubescens Forest (CEGL000567)
- Populus tremuloides / Amelanchier alnifolia - Symphoricarpos oreophilus / Tall Forbs Forest (CEGL000568)
- Populus tremuloides / Amelanchier alnifolia - Symphoricarpos oreophilus / Thalictrum fendleri Forest (CEGL000569)
- Populus tremuloides / Quercus gambelii / Symphoricarpos oreophilus Forest (CEGL000598)
- Populus tremuloides / Symphoricarpos oreophilus Forest (CEGL000610)
- Populus tremuloides / Symphoricarpos oreophilus / Bromus carinatus Forest (CEGL000611)
- Populus tremuloides / Symphoricarpos oreophilus / Calamagrostis rubescens Forest (CEGL000612)
- Populus tremuloides / Symphoricarpos oreophilus / Carex rossii Forest (CEGL000613)
- Populus tremuloides / Symphoricarpos oreophilus / Festuca thurberi Forest (CEGL000614)
- Populus tremuloides / Symphoricarpos oreophilus / Thalictrum fendleri Forest (CEGL000616)
- Populus tremuloides / Symphoricarpos oreophilus / Wyethia amplexicaulis Forest (CEGL000617)
- Populus tremuloides / Tall Forbs Forest (CEGL000618)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G3G5.

Global Comments: Confusion between this association and the more broadly defined and distributed *Populus tremuloides / Symphoricarpos oreophilus* Forest (CEGL000610) is not uncommon. This association was once part of the more broadly defined association, which needs review and refinement. Currently this aspen forest association is characterized by the presence of (1) a low-shrub layer with over 10% cover that is dominated by *Symphoricarpos oreophilus*, (2) an herbaceous layer with at least 10% cover that is dominated by one or more of several tall forb species, and (3) the absence of a tall-shrub layer (<10% cover) (Mueggler 1988).

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs in small stands scattered infrequently across Horse Ranch Mountain and the Upper Kolob Plateau, specifically Lava Point and Oak Spring Valley.

Global Range: This deciduous forest association occurs in the mountains and plateaus of Utah, western Wyoming, northern Nevada, and southern Idaho.

Nations: US
States/Provinces: ID NV UT WY

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH57, 87, 114, 353
Classification Confidence: 1 **Identifier:** CEGL000615
REFERENCES: Bourgeron and Engelking 1994, Driscoll et al. 1984, Mueggler 1988, Mueggler and Campbell 1982, Mueggler and Campbell 1986, Youngblood and Mueggler 1981

I.B.2.N.d. Temporarily flooded cold-deciduous forest

I.B.2.N.d.38. POPULUS FREMONTII TEMPORARILY FLOODED FOREST ALLIANCE

Fremont Cottonwood Temporarily Flooded Forest Alliance

POPULUS FREMONTII / SALIX EXIGUA FOREST

Fremont Cottonwood / Coyote Willow Forest

ELEMENT CONCEPT

GLOBAL SUMMARY: This association is documented from along large rivers in Utah, southwestern New Mexico, and may occur in southern Arizona. Stands are found on stable bars at mid elevations of the floodplain. Substrates are typically relatively recently deposited alluvium. Periodic flooding is required for the growth, maintenance and reproduction of this forest. Characteristic of this deciduous forest is the dominance of *Populus fremontii* in the moderately dense to dense tree canopy and *Salix exigua* in the tall-shrub layer. *Salix gooddingii* or *Baccharis salicifolia* are not abundant or are absent. Other associated species include *Distichlis spicata, Muhlenbergia asperifolia, Phragmites australis*, and species of *Equisetum, Juncus*, and *Carex*. Introduced species such as *Elaeagnus angustifolia, Tamarix* spp., *Poa pratensis, Melilotus* spp., and other exotic forage species are often present in disturbed stands.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: This association occurs along streambanks of canyon drainages at elevations of 4000 and 5600 feet. Stream gradient is gentle and soils are sandy.

Global Environment: This riparian forest association is documented from along large rivers in southwestern Utah, southwestern New Mexico, and Arizona. Elevation ranges from 1220-1700 m. Stands are found on stable bars in floodplains and along streambanks in canyon drainages. Substrates are typically relatively recently deposited alluvium. Stream gradient is typically gentle, and soils are sandy.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Stands of *Populus fremontii / Salix exigua* are small and scattered infrequently along canyon streams in the park. *Populus fremontii* trees are mostly immature, with a canopy height of 5-10 m and foliar cover of 10-20%. Mature trees may be present with cover of 10%. *Acer negundo* is occasionally present in the stand. The shrub layer is a mixture of upland species and riparian species, but clearly dominated by *Salix exigua*. The herbaceous layer is also variable. *Poa pratensis, Equisetum* spp., *Melilotus officinalis*, and a variety of other riparian species of minimal cover occupy sampled sites.

Global Vegetation: This association is characterized by an open to dense deciduous tree canopy that is dominated by *Populus fremontii*, with *Salix exigua* dominating the tall-shrub layer. *Acer negundo* may also be present in the tree canopy, but *Salix gooddingii* is typically not present. *Baccharis salicifolia* is also typically not abundant in the shrub layer, but a variety of other riparian and upland shrub species may be present, including *Betula occidentalis, Ericameria nauseosa, Artemisia tridentata*, or *Quercus gambelii*. The herbaceous layer is generally sparse, depending on the density of the shrub and tree layers. *Distichlis spicata, Muhlenbergia asperifolia, Phragmites australis*, and species of *Equisetum, Juncus*, and *Carex* are commonly present. Introduced species such as *Elaeagnus angustifolia, Tamarix* spp., *Melilotus* spp., *Bromus* spp., and *Poa pratensis* are often present in disturbed stands.

Global Dynamics: Periodic flooding is required for the growth, maintenance and reproduction of this forest.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Acer negundo, Populus fremontii*
TALL SHRUB	*Betula occidentalis, Salix exigua*

Global

Stratum	Species
TREE CANOPY	*Populus fremontii*
TALL SHRUB	*Salix exigua*
GRAMINOID	*Phragmites australis*
FORB	*Artemisia ludoviciana*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Acer negundo, Populus fremontii*
TALL SHRUB	*Salix exigua*

Global

Stratum	Species
TREE CANOPY	*Populus fremontii*
TALL SHRUB	*Salix exigua*

OTHER NOTEWORTHY SPECIES

Global

Stratum	Species
TREE CANOPY	*Elaeagnus angustifolia*
GRAMINOID	*Bromus tectorum*

GLOBAL SIMILAR ASSOCIATIONS:

- Populus fremontii - Salix gooddingii / Salix exigua Forest (CEGL002684)
- Populus fremontii / Baccharis salicifolia Woodland (CEGL000941)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: This association was not reported in the Handbook of Wetland Vegetation Communities of New Mexico (Muldavin et al. 2000a) and needs further review to distinguish it from similar associations such as *Populus fremontii - Salix gooddingii / Salix exigua* Forest (CEGL002684). Part of the confusion is related to a taxonomic change in Rio Grande cottonwood from *Populus fremontii var. wislizeni* S. Wats. to *Populus deltoides ssp. wislizeni* (S. Wats.) Eckenwalder. This change resulted in part of this association (central NM along the Rio Grande) being moved into *Populus deltoides / Salix exigua* Woodland (CEGL002685). More work is needed to determine the range and possible areas of overlap between these two cottonwood species, and vegetation types in which they are important.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was documented in the Kolob Canyons area of the park and the East Fork of the Virgin River.

Global Range: This riparian forest is known from southwestern New Mexico along the Gila River and the East Fork of the Virgin River in southwestern Utah. It likely occurs elsewhere in Utah and Arizona.

Nations: US
States/Provinces: AZ? NM UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 25, 521
Classification Confidence: 3 **Identifier:** CEGL000666
REFERENCES: Bourgeron and Engelking 1994, Driscoll et al. 1984, Muldavin et al. 1993b, Muldavin et al. 2000a, Szaro 1989

I.B.2.N.d.25. POPULUS TREMULOIDES TEMPORARILY FLOODED FOREST ALLIANCE

Quaking Aspen Temporarily Flooded Forest Alliance

POPULUS TREMULOIDES / QUERCUS GAMBELII / SYMPHORICARPOS OREOPHILUS FOREST

Quaking Aspen / Gambel Oak / Mountain Snowberry Forest

ELEMENT CONCEPT

GLOBAL SUMMARY: This deciduous forest is documented from central New Mexico and southwestern Utah where it occurs along drainages on plateaus and on mountain slopes. Elevations range from 2240-2460 m. Stands occur along intermittent streams on moderately steep to steep slopes with western aspects. Soils tend to be fine-textured. The vegetation is characterized by a moderately dense to dense tree canopy dominated by *Populus tremuloides*. *Quercus gambelii* dominates the tall-shrub layer and may be present in the tree canopy. *Symphoricarpos oreophilus* is typically present and may form the short-shrub layer with several other shrub species. The herbaceous layer may be diverse but is generally sparse.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: This is represented by one stand in Zion NP, found on a steep, southwest-facing slope. Soils are clay loam, and moisture conditions appear to be intermittently mesic.

Global Environment: This deciduous forest is known from central New Mexico and southwestern Utah where it occurs along drainages on plateaus and in mountain slopes. Elevations range from 2240-2460 m. Stands occur along intermittent streams on moderately steep to steep slopes with western aspects. Soils tend to be fine-textured.

VEGETATION DESCRIPTION

Zion National Park Vegetation: In this association *Populus tremuloides* is unmistakably dominant in the tree canopy layer. *Quercus gambelii* in tree form may also contribute to the canopy. The shrub layer is dominated by *Quercus gambelii*, and *Symphoricarpos oreophilus* may be well represented or simply present. Various grasses and forbs, commonly *Vicia americana, Achillea millefolium, Poa pratensis*, and *Mertensia arizonica*, represent the herbaceous understory.

Global Vegetation: The association is characterized by a moderately dense to dense tree canopy dominated by *Populus tremuloides*. *Quercus gambelii* dominates the tall-shrub layer and may be present in the tree canopy. *Symphoricarpos oreophilus* forms the short-shrub layer with several other shrub species such as *Amelanchier* spp. , *Rosa woodsii*, and small *Quercus gambelii*. The herbaceous layer may be diverse but is generally sparse. Herbaceous species include *Achillea millefolium, Bromus anomalus, Senecio eremophilus, Solidago velutina, Thalictrum fendleri, Vicia americana*, and the introduced perennial graminoid *Poa pratensis*.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Populus tremuloides, Quercus gambelii*
TALL SHRUB	*Quercus gambelii, Symphoricarpos oreophilus*

Global

Stratum	Species
TREE CANOPY	*Populus tremuloides, Quercus gambelii*
SHORT SHRUB	*Symphoricarpos oreophilus*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Populus tremuloides, Quercus gambelii*
TALL SHRUB	*Quercus gambelii, Symphoricarpos oreophilus*

Global

Stratum	Species
TREE CANOPY	*Populus tremuloides*
SHORT SHRUB	*Symphoricarpos oreophilus*

OTHER NOTEWORTHY SPECIES

Global

Stratum	Species
GRAMINOID	*Poa pratensis*

GLOBAL SIMILAR ASSOCIATIONS:

- Populus tremuloides / Symphoricarpos oreophilus Forest (CEGL000610)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: This poorly known association is reported from only 2 locations and needs additional classification work to further define the type and its range.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs in the intermittent stream of Little Creek, which is located near the Kolob Terrace Road.

Global Range: This association is known from central New Mexico and southwestern Utah, and may occur in similar riparian habitats in Arizona and possibly southern Colorado.

Nations: US
States/Provinces: NM UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH56
Classification Confidence: 2 **Identifier:** CEGL000598
REFERENCES: Bourgeron and Engelking 1994, Driscoll et al. 1984, Freeman and Dick-Peddie 1970

I.C.3.N.a. Mixed needle-leaved evergreen - cold-deciduous forest

I.C.3.N.a.39. ABIES CONCOLOR - POPULUS TREMULOIDES FOREST ALLIANCE

White Fir - Quaking Aspen Forest Alliance

POPULUS TREMULOIDES - ABIES CONCOLOR / POA PRATENSIS SEMI-NATURAL FOREST

Quaking Aspen - White Fir / Kentucky Bluegrass Semi-natural Forest

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at elevations above 7000 feet on flat to gently sloping terrain. Soils are somewhat poorly drained clays.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Populus tremuloides* and *Abies concolor* are prominent in the canopy layer of this association. The shrub layer is not significant, but there may be a presence of *Quercus gambelii* or *Symphoricarpos oreophilus*. The herbaceous layer is clearly dominated by *Poa pratensis* (over 40% cover). Other herbaceous species that are commonly present and contribute minor cover are *Lupinus argenteus, Vicia americana, Achillea millefolium*, and *Tragopogon dubius*.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Abies concolor, Populus tremuloides*
TALL SHRUB	*Quercus gambelii*
GRAMINOID	*Poa pratensis*
FORB	*Vicia americana*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Abies concolor, Populus tremuloides*
GRAMINOID	*Poa pratensis*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: GW.

Global Comments: This association was described by Mueggler (1988) in his comprehensive report on aspen communities of the Intermountain West. Because it is a grazing-induced type it was not recognized in the USNVC until now (2002). It is likely to be widely distributed in the mountains of Utah and Nevada, and may also occur in Colorado.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is restricted to the vicinity of Lava Point on Kolob Reservoir quadrangle. It also is likely to occur outside the park boundary on the Upper Kolob Plateau.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT, NV, CO?

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH18
Classification Confidence: 3 **Identifier:** CEGL002947
REFERENCES: Mueggler 1988

POPULUS TREMULOIDES - ABIES CONCOLOR / SYMPHORICARPOS OREOPHILUS FOREST

Quaking Aspen - White Fir / Mountain Snowberry Forest

ELEMENT CONCEPT

GLOBAL SUMMARY: This mixed evergreen-deciduous forest is documented from the mountains and plateaus of Utah and northern Nevada at montane elevations. Stands are characterized by a moderately dense to dense tree canopy codominated by *Populus tremuloides* and *Abies concolor* with *Symphoricarpos oreophilus* dominating the short-shrub layer. Often the conifers form a subcanopy that will eventually overtake the *Populus tremuloides*. Adjacent vegetation is usually forests dominated by *Abies concolor* or *Pseudotsuga menziesii*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: In the park this association occurs at elevations above 7000 feet on flat to gently sloping terrain. Soils are loamy. Litter cover is at least 50%, and the remaining ground cover is bare ground or volcanic rock.

Global Environment: These montane, mixed evergreen-deciduous forests have been reported from mountain and plateau environments of the Great Basin and Colorado Plateau, where they occur between 2100-2800 m. Sites are gently to moderately steep slopes on all aspects. Ground cover is dominated by litter, bare ground and rock. Parent materials are sedimentary (sandstone) or volcanic. Soils are generally well-drained loams or sandy loams with substantial organic matter. Past disturbance appears to be a key factor in distribution of these forests. At drier or rocky sites these forests may be somewhat stable, but in mesic areas they are seral communities which become established following fire.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association occurs in small stands in the midst of surrounding *Abies concolor* (white fir) -dominated forests. The few remaining stands of this successional type are at different stages of succession. *Populus tremuloides* generally has greater foliar cover than *Abies concolor* in this association, but young conifer seedlings and emergent conifers show evidence of eventually dominating these stands. *Pinus ponderosa* may also be present. *Symphoricarpos oreophilus* is well represented in the shrub layer at 10-30% cover. Other shrubs present are *Acer grandidentatum, Quercus gambelii*, and *Amelanchier alnifolia*. Herbaceous cover is inconsistent. In stands where canopy cover is less than 50%, a diverse array of montane forbs and grasses contribute up to 30% cover. Some herbaceous species documented for this association include *Vicia americana, Osmorhiza occidentalis, Maianthemum stellatum, Thalictrum fendleri, Achillea millefolium*, and *Poa pratensis*.

Global Vegetation: This association is characterized by a moderately dense to dense, mixed evergreen-deciduous tree canopy that is codominated by *Populus tremuloides* and *Abies concolor*. *Abies lasiocarpa* is typically not present, but individuals of *Pseudotsuga menziesii, Picea engelmannii, Picea pungens*, or *Pinus ponderosa* are not uncommon. Often the conifers form a subcanopy that will eventually overtake the *Populus tremuloides* in this early seral type. *Symphoricarpos oreophilus* is the characteristic species of the short-shrub layer and typically dominates. Associates include several other common species in lesser amounts such as *Amelanchier* spp., *Arctostaphylos patula, Mahonia repens, Juniperus communis, Paxistima myrsinites*, and *Rosa woodsii*. The moderately dense herbaceous layer is usually luxuriant and species-rich in comparison to adjacent conifer forests because light is able to penetrate the *Populus tremuloides* tree canopy. Herbaceous species are diverse and variable. Common graminoids are *Achnatherum occidentale, Bromus anomalus, Bromus carinatus, Carex geyeri, Carex rossii, Elymus glaucus, Elymus trachycaulus, Festuca arizonica, Poa fendleriana*, and *Poa nervosa*. Forbs may include *Achillea millefolium, Eucephalus engelmannii, Frasera speciosa, Geranium* spp., *Lathyrus* spp., *Rudbeckia occidentalis, Osmorhiza berteroi (= Osmorhiza chilensis)*, and *Thalictrum fendleri*. The introduced graminoids *Poa pratensis* and *Dactylis glomerata* are common in many stands.

Global Dynamics: *Abies concolor* is much more shade-tolerant than *Populus tremuloides* and is the most important regenerating species under closed-canopy conditions. Most of these mixed stands are seral and, in the absence of fire will eventually be dominated by *Abies concolor*. This unique forest alliance is linked to gap-forming disturbances, such as fire or windthrow, which allow regeneration of *Populus tremuloides* and limit abundances of *Abies concolor* (Mueggler 1988, Mueggler and Campbell 1986).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Abies concolor, Populus tremuloides*
TALL SHRUB	*Acer grandidentatum, Symphoricarpos oreophilus*
GRAMINOID	*Poa pratensis*
FORB	*Achillea millefolium, Vicia americana*

Global

Stratum	Species
TREE CANOPY	*Abies concolor, Populus tremuloides, Pseudotsuga menziesii*
SHORT SHRUB	*Symphoricarpos oreophilus*
FORB	*Osmorhiza berteroi*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Abies concolor, Populus tremuloides*
TALL SHRUB	*Symphoricarpos oreophilus*

Global

Stratum	Species
TREE CANOPY	*Abies concolor, Populus tremuloides*
SHORT SHRUB	*Symphoricarpos oreophilus*

OTHER NOTEWORTHY SPECIES

Global

Stratum	Species
GRAMINOID	*Poa pratensis*

GLOBAL SIMILAR ASSOCIATIONS:

- Populus tremuloides - Abies concolor / Arctostaphylos patula Forest (CEGL000522)--the only other mixed aspen-white fir association in the classification; described from Nevada.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G4G5.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is restricted to the vicinity of Lava Point on Kolob Reservoir quadrangle. It may occur outside the park boundary on the Upper Kolob Plateau.

Global Range: This forest association is widespread in the mountains of Utah and northern Nevada, and likely occurs in adjacent states where *Abies concolor* and *Populus tremuloides* co-occur.

Nations: US
States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH8, RH9, 105
Classification Confidence: 2 **Identifier:** CEGL000523
REFERENCES: Bourgeron and Engelking 1994, Driscoll et al. 1984, Mueggler 1988, Mueggler and Campbell 1986

II. WOODLAND

II.A.4.N.a. Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

II.A.4.N.a.38. JUNIPERUS OSTEOSPERMA WOODLAND ALLIANCE

Utah Juniper Woodland Alliance

JUNIPERUS OSTEOSPERMA / ARTEMISIA TRIDENTATA WOODLAND

Utah Juniper / Big Sagebrush Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This sparse woodland association has been reported from semi-arid foothills, plateaus and mountains throughout much of the western Rocky Mountains, Colorado Plateau, and Great Basin. Elevation ranges from 1220-2260 m (4000-7400 feet). This community generally occurs on a variety of slopes and aspects, often at the break between foothill and basin. Soils are generally coarse-textured, calcareous alluvium derived from sandstone and shale. Evidence of erosion such as gullies and rills is not uncommon. There are generally significant amounts of bare ground, litter, and desert pavement at the soil surface. Rock cover is variable. The vegetation is characterized by an open tree canopy dominated by *Juniperus osteosperma* with *Artemisia tridentata* dominating the sparse to moderately dense short-shrub layer. Tree canopy cover values are over 5%, but typically less than 15%. Other shrubs, such as *Atriplex canescens, Atriplex confertifolia, Artemisia nova, Chrysothamnus viscidiflorus, Ephedra nevadensis, Ericameria nauseosa, Gutierrezia sarothrae, Opuntia* spp., or *Purshia stansburiana*, may be present, but generally with low cover. The sparse to moderately dense herbaceous layer is dominated by graminoids such as *Achnatherum hymenoides, Aristida* spp., *Bouteloua* spp., *Carex filifolia, Elymus elymoides, Hesperostipa comata, Pleuraphis jamesii (= Hilaria jamesii), Pascopyrum smithii, Poa secunda, Pseudoroegneria spicata, Sporobolus* spp., and introduced annual *Bromus* spp. Associated forbs may include *Artemisia frigida, Eriogonum* spp., *Gayophytum racemosum, Leptodactylon pungens, Phlox hoodii*, and *Plantago patagonica*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on flat to gentle terrain at or below 4000 feet in elevation. Soils are sandy.

Global Environment: This sparse woodland association has been reported from semi-arid foothills, plateaus and mountains throughout much of the western Rocky Mountains, Colorado Plateau, and Great Basin. Elevation ranges from 1220-2260 m (4000-7400 feet). This community generally occurs on a variety of slopes and aspects, often at the break between foothill and basin. Soils are generally coarse-texture, calcareous alluvium derived from sandstone and shale. Evidence of erosion such as gullies and rills is not uncommon. There are generally significant amounts of bare ground, litter, and desert pavement at the soil surface. Rock cover is variable.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Juniperus osteosperma* has 20% cover in this association and ranges 5-10 m in height. The understory is prominently *Artemisia tridentata* accompanied by sparse cover of *Ephedra nevadensis, Gutierrezia sarothrae*, and *Opuntia macrorhiza*. The herbaceous layer is absent or very sparse.

Global Vegetation: The vegetation is characterized by an open tree canopy dominated by *Juniperus osteosperma* with *Artemisia tridentata* dominating the sparse to moderately dense short-shrub layer. Tree canopy cover values are over 5%, but typically less than 15%. Other shrubs, such as *Atriplex canescens, Atriplex confertifolia, Artemisia nova, Chrysothamnus viscidiflorus, Ephedra nevadensis, Ericameria nauseosa, Gutierrezia sarothrae, Opuntia* spp., or *Purshia stansburiana*, may be present, but generally with low cover. The sparse to moderately dense herbaceous layer is dominated graminoids such as *Achnatherum hymenoides, Aristida* spp., *Bouteloua* spp., *Carex filifolia, Elymus elymoides, Hesperostipa comata, Pleuraphis jamesii (= Hilaria jamesii), Pascopyrum smithii, Poa secunda, Pseudoroegneria spicata, Sporobolus* spp., and introduced annual *Bromus* spp. Associated forbs may include *Artemisia frigida, Eriogonum* spp., *Gayophytum racemosum, Leptodactylon pungens, Phlox hoodii*, and *Plantago patagonica*.

Global Dynamics: Fires in this association are thought to be infrequent because smaller *Juniperus osteosperma* and *Artemisia tridentata* are easily killed by burns and do not resprout (Barney and Frischknecht 1974, Everett 1987). *Artemisia tridentata* will re-establish relatively quickly (about 10-20 years) if a seed source is nearby (Barney and Frischknecht 1974, Bunting 1987). However, *Juniperus osteosperma* is relatively slow to recover following fire, and sagebrush may dominate the sites for decades (Jameson et al. 1962). If fire-return intervals are more frequent than 10 years then *Artemisia tridentata* has difficulty recovering (Bunting 1987, Everett 1987). This community may be increasing in extent by invading adjacent grasslands and steppe, where there has been a reduction of fire frequency due to fire suppression and fine fuels removal by grazing livestock that would allow fires to spread (Johnson and Payne 1968). Fire, drought and competition with grasses are thought to have kept *Juniperus* spp. communities in the past restricted to rocky areas that do not burn frequently (Wright et al. 1979).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma*
TALL SHRUB	*Artemisia tridentata*

Global

Stratum	Species
TREE CANOPY	*Juniperus osteosperma*
SHORT SHRUB	*Artemisia tridentata*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma*
TALL SHRUB	*Artemisia tridentata*

Global

Stratum	Species
TREE CANOPY	*Juniperus osteosperma*
SHORT SHRUB	*Artemisia tridentata*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs at the southern boundary of Zion National Park on the mesa overlooking Huber Wash. It is uncommon within the park boundaries.

Global Range: This sparse woodland association occurs throughout much of the western Rocky Mountains, Colorado Plateau, and Great Basin region.

Nations: US
States/Provinces: AZ CA CO ID MT NM NV UT WY

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 504
Classification Confidence: 2 **Identifier:** CEGL000730
REFERENCES: Barney and Frischknecht 1974, Blackburn 1967, Blackburn et al. 1968a, Blackburn et al. 1968c, Blackburn et al. 1969a, Blackburn et al. 1969e, Blackburn et al. 1971, Bourgeron and Engelking 1994, Bradley 1964, Brotherson and Evenson 1983, Bunting 1987, Dastrup 1963, DeVelice and Lesica 1993, Donart et al. 1978b, Driscoll et al. 1984, Everett 1987, Francis 1986, Isaacson 1967, Johnson and Payne 1968, Larson and Moir 1987, Milton and Purdy 1983, Moir and Carleton 1987, Stuever and Hayden 1997a, USFS 1983a, West et al. 1998, Wright et al. 1979

II.A.4.N.a.8. JUNIPERUS SCOPULORUM WOODLAND ALLIANCE

Rocky Mountain Juniper Woodland Alliance

JUNIPERUS SCOPULORUM - QUERCUS GAMBELII WOODLAND [PROVISIONAL]

Rocky Mountain Juniper - Gambel Oak Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at gentle to moderate drainage bottoms and occasionally on hillsides. Elevation ranges 5400 to 6700 feet. Leaf litter is usually above 50%, and soil texture has not been documented.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Juniperus scopulorum, Juniperus osteosperma*, and *Quercus gambelii* dominate the canopy in some combination with total cover of 20-80%. *Pinus monophylla* may also occur in the canopy with minimal cover. If *Quercus gambelii* is not in the canopy, it occurs in the tall-shrub layer with high cover. Other shrubs may be present, but have minimal cover. Herbaceous cover is usually absent, and the ground is covered with leaf litter. In the northeastern corner of the park, this association occurs again with a canopy cover of *Juniperus scopulorum* and *Quercus gambelii*. *Pinus edulis* is also present in the canopy. Associated shrubs are *Artemisia tridentata* and *Purshia tridentata*. These shrubs are a major component of surrounding shrubland vegetation. This association was observed and documented during the Accuracy Assessment phase of project and needs more plot data.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIESZION NATIONAL PARK

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Juniperus scopulorum, Quercus gambelii*
TALL SHRUB	*Quercus gambelii*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus scopulorum, Quercus gambelii*
TALL SHRUB	*Quercus gambelii*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs throughout the northern half of the park.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 108, 525. AA Plots: 68, 70, 288, 412, 435, 436, 452, 458, 646, 647, 798, 801
Classification Confidence: 3 **Identifier:** CEGL002967
REFERENCES: None available.

II.A.4.N.a.18. PINUS EDULIS - (JUNIPERUS SPP.) WOODLAND ALLIANCE

Two-needle Pinyon - (Juniper species) Woodland Alliance

PINUS EDULIS - JUNIPERUS OSTEOSPERMA / ARCTOSTAPHYLOS PATULA WOODLAND

Two-needle Pinyon - Utah Juniper / Greenleaf Manzanita Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association was sampled on mesas above 6200 feet with gentle to steep slopes, and southern to western aspects. Soil textures are sandy loam and clay loam.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Pinus edulis* and *Juniperus osteosperma* canopy cover ranges 15-30%, and heights are 5-10 m. The shrub layer is 1-2 m high and dominated by *Arctostaphylos patula*, 5-30% cover. *Amelanchier utahensis* and *Quercus gambelii* are commonly present and contribute less than 10% cover combined. *Poa fendleriana* is usually present. Other herbaceous species are sparse and inconsistently represented among the stands sampled.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis*
SHORT SHRUB	*Amelanchier utahensis, Arctostaphylos patula*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis*
SHORT SHRUB	*Arctostaphylos patula*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on high-elevation mesas on the eastern side of the park, from The Great White Throne north to the mesas rimming Goose Creek.

Global Range:

Nations: US
States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 9, 11, 99, 100, 373, 380
Classification Confidence: 3 **Identifier:** CEGL002939
REFERENCES: None available.

PINUS EDULIS - JUNIPERUS OSTEOSPERMA / CERCOCARPUS INTRICATUS WOODLAND
Two-needle Pinyon - Utah Juniper / Littleleaf Mountain-mahogany Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This woodland association occurs on dry, sandstone ridgetops, mesa edges, outcrops, and colluvial slopes at moderate elevations (1740-2380 m) on the Colorado Plateau and in extreme northwestern Colorado, adjacent Utah, and possibly Wyoming. South and southwest aspects are common. Exposed bedrock and large rock may cover over 50% of the stand with vegetation growing in the cracks. These sandstone-derived soils are generally poorly developed, coarse-textured and skeletal. Bare soil is common. The vegetation is characterized by an open tree canopy (10-25% cover) codominated by *Pinus edulis* and *Juniperus osteosperma*, and by the dominance of *Cercocarpus intricatus* in the relatively sparse short-shrub layer (10-25% cover). *Amelanchier utahensis, Arctostaphylos patula, Quercus gambelii*, or *Yucca* spp. are often present in many stands. Herbaceous cover is sparse (<5% cover) and is composed of scattered forbs and grasses such as species of *Cryptantha, Penstemon*, and *Opuntia, Gutierrezia sarothrae, Achnatherum hymenoides (= Oryzopsis hymenoides), Bouteloua gracilis*, and *Poa fendleriana*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on steep sandstone slopes above 6500 feet with southern to southwestern aspects. Shallow sandy soils develop in crevices and depressions in sandstone, allowing vegetation to take hold on the steep slopes.

Global Environment: This woodland association occurs on dry, sandstone ridgetops, mesa edges, outcrops, and colluvial slopes at moderate elevations (1740-2380 m) on the Colorado Plateau and in extreme northwestern Colorado, adjacent Utah, and possibly Wyoming. South and southwest aspects are common. Exposed bedrock and large rock may cover over 50% of the stand with vegetation growing in the cracks. These sandstone-derived soils are generally poorly developed, coarse-textured and skeletal. Bare soil is common.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Vegetation is sparse with total foliar cover averaging 25%. *Pinus edulis* and *Pinus monophylla* hybrids may occur, but the dominant species is more likely to be *Pinus edulis* at elevations above 6500 feet. *Cercocarpus intricatus* is the indicator species of this association, but is sparse with only 10% cover. Other species that commonly contribute to the short-shrub layer are *Amelanchier utahensis, Quercus gambelii*, and the dwarf-shrub *Yucca elata var. utahensis*. The herbaceous layer is sparse, yet diverse. Species that are commonly represented are *Poa fendleriana* and *Penstemon* spp.

Global Vegetation: The association is characterized by an open tree canopy (10-25% cover) codominated by *Pinus edulis* and *Juniperus osteosperma*, and by the dominance of *Cercocarpus intricatus* in the relatively sparse short-shrub layer (10-25% cover). *Amelanchier utahensis, Arctostaphylos patula, Quercus gambelii*, or *Yucca* spp. are often present in many stands. Herbaceous cover is sparse (<5% cover) and is composed of scattered forbs and grasses such as species of *Cryptantha, Penstemon*, and *Opuntia, Gutierrezia sarothrae, Achnatherum hymenoides (= Oryzopsis hymenoides), Bouteloua gracilis*, and *Poa fendleriana*.

Global Dynamics: Fire is not frequent because open tree and shrub canopies and lack of continuous fine fuel prevent the spread.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis, Pinus monophylla*
TALL SHRUB	*Amelanchier utahensis, Cercocarpus intricatus*

Global

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis*
TALL SHRUB	*Amelanchier utahensis, Cercocarpus intricatus*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis, Pinus monophylla*
TALL SHRUB	*Cercocarpus intricatus*

Global

Stratum	Species
TREE CANOPY	*Pinus edulis*
TALL SHRUB	*Cercocarpus intricatus*

GLOBAL SIMILAR ASSOCIATIONS:

- Juniperus osteosperma / Cercocarpus intricatus Woodland (CEGL000733)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G3.

Global Comments: Compare this association with *Juniperus osteosperma / Cercocarpus intricatus* Woodland (CEGL000733) which is very similar, but lacks *Pinus edulis*.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was documented in remote regions of the Temple of Sinawava quadrangle. It is likely that it occurs occasionally throughout the east-central region of the park.

Global Range: This plant association is found on the Colorado Plateau and in extreme northwestern Colorado, adjacent Utah, and possibly Wyoming.

Nations: US
States/Provinces: CO UT WY?

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 304
Classification Confidence: 2 **Identifier:** CEGL000779
REFERENCES: Baker 1983b, Baker 1983c, Baker 1984a, Baker and Kennedy 1985, Bourgeron and Engelking 1994, Driscoll et al. 1984, Zimmerman 1978

PINUS EDULIS - JUNIPERUS OSTEOSPERMA / PURSHIA STANSBURIANA WOODLAND

Two-needle Pinyon - Utah Juniper / Stansbury Cliff-rose Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This woodland association is known from the Colorado Plateau south to central Arizona. It occurs on dry hillslopes and mesas. Elevations range from 1825-2075 m. Stands occur on gentle to moderately steep slopes on all aspects. The soils are generally shallow, calcareous and rocky, ranging from sand to sandy loam in texture. Rock outcrop and bare soil are common. Parent materials include sandstone and shale. The vegetation is characterized by an open to moderately dense tree canopy (10-60% cover) codominated by *Pinus edulis* and *Juniperus osteosperma*. *Purshia stansburiana* dominates or codominates the sparse to moderately dense short-shrub layer often with *Artemisia tridentata* in the northern part of its range. *Cercocarpus montanus* and *Purshia tridentata* are scarce or absent. Other shrubs may be present including *Amelanchier utahensis, Arctostaphylos patula, Chamaebatiaria millefolium, Ephedra viridis, Gutierrezia sarothrae, Mahonia trifolioliata, Quercus gambelii* (<5% cover), or species of *Yucca* and *Opuntia*. Herbaceous cover is variable, ranging from sparse to moderately dense, but generally dominated by graminoids (>5% cover) with scattered forbs.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on moderate slopes, and eastern to southwestern aspects at 6200 to 7000 feet. Soil texture is sandy loam.

Global Environment: This woodland occurs on the Colorado Plateau south to central Arizona, on dry hillslopes and mesas. Elevations range from 1825-2075 m. Stands occur on gentle to moderately steep slopes on all aspects. The soils are generally shallow, calcareous and rocky, ranging from sand to sandy loam in texture. Rock outcrop and bare soil are common. Parent materials include sandstone and shale.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Mature stands of *Pinus edulis* and *Juniperus osteosperma* in this association have canopy cover of 20-30%. *Pinus monophylla* may occur with *Pinus edulis* or as a hybrid in this area of the park. The tall-shrub layer is conspicuously represented (especially when in flower) by few, but large, mature *Purshia stansburiana*. Foliar cover is usually no more than 10%. *Amelanchier utahensis, Quercus gambelii*, and *Arctostaphylos patula* are commonly present as a short-shrub layer with cover less than 10%. Herbaceous cover is inconsistently represented and very sparse.

Global Vegetation: This association is characterized by an open to moderately dense tree canopy (10-60% cover) codominated by *Pinus edulis* and *Juniperus osteosperma*. *Purshia stansburiana* dominates or codominates the sparse to moderately dense short-shrub layer often with *Artemisia tridentata* in the northern part of its range. *Cercocarpus montanus* and *Purshia tridentata* are scarce or absent. Other shrubs may be present including *Amelanchier utahensis, Arctostaphylos patula, Artemisia tridentata, Chamaebatiaria millefolium, Ephedra viridis, Gutierrezia sarothrae, Mahonia trifoliolata, Quercus gambelii* (<5% cover), or species of *Yucca* and *Opuntia*. Herbaceous cover is variable, ranging from sparse to moderately dense, but generally dominated by graminoids (>5% cover) with scattered forbs. Associated graminoids include *Achnatherum hymenoides (= Oryzopsis hymenoides), Bouteloua curtipendula, Bouteloua gracilis, Bouteloua hirsuta, Elymus elymoides, Hesperostipa comata, Hesperostipa neomexicana, Koeleria macrantha, Poa fendleriana*, and *Schizachyrium scoparium*. Forbs may include *Artemisia ludoviciana, Artemisia frigida, Calliandra humilis, Penstemon linarioides*, and *Polygala alba*.

Global Dynamics: Stuever and Hayden (1997) described two phases of this plant community, an *Artemisia tridentata* phase and a *Purshia stansburiana* phase. Both are restricted geographically with the *Artemisia tridentata* phase common in northern Arizona, southern Utah, northern New Mexico, and southwestern Colorado where winter precipitation is higher than summer. The *Purshia stansburiana* phase, which lacks *Artemisia tridentata*, occurs in central Arizona where summer monsoon precipitation is higher than winter (Stuever and Hayden 1997). Fires in this association are thought to be infrequent because *Pinus edulis, Juniperus osteosperma*, and *Juniperus monosperma* are killed or severely damaged by burns and do not resprout (Wright et al. 1979). *Purshia stansburiana* is also generally killed by fire; however, it is known to resprout after cool burns (Britton and Wright 1983, Wright et al. 1979).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis*
TALL SHRUB	*Amelanchier utahensis, Arctostaphylos patula, Purshia stansburiana*

Global

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis*
TALL SHRUB	*Amelanchier utahensis, Arctostaphylos patula, Artemisia tridentata, Purshia stansburiana*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis*
TALL SHRUB	*Amelanchier utahensis, Arctostaphylos patula, Purshia stansburiana*

Global

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis*
TALL SHRUB	*Purshia stansburiana*

GLOBAL SIMILAR ASSOCIATIONS:

- Pinus edulis - Juniperus spp. / Artemisia tridentata Woodland (CEGL000776)--This association is similar to the *Artemisia tridentata* phase of this association except *Purshia stansburiana* not codominant.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G4?.

Global Comments: *Pinus edulis / Purshia mexicana* Woodland was changed to *Pinus edulis / Purshia stansburiana* Woodland (CEGL000782) on 2001-09-04 because of a taxonomic change of the nominal species. *Purshia mexicana var. stansburiana* (Torr.) Welsh is now recognized as *Purshia stansburiana* (Torr.) Henrickson (Kartesz 1999). *Purshia mexicana* (D. Don) Henrickson, a closely related species, occurs in Chihuahua, Durango and Zacateca, Mexico, and possibly extreme southern Arizona, and is not known to be present in this association (Cronquist et al. 1997).

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on high-elevation mesas and drainages in the vicinity of Highway 9 on the eastern side of the park.

Global Range: This woodland association occurs from central Arizona, western New Mexico, southwestern Colorado, and southern Utah.

Nations: US
States/Provinces: AZ CO NM UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 10, 212, 316
Classification Confidence: 1 **Identifier:** CEGL000782
REFERENCES: BIA 1979, Baker 1980a, Baker 1984a, Bourgeron and Engelking 1994, Britton and Wright 1983, Cronquist et al. 1997, Driscoll et al. 1984, Isaacson 1967, Kartesz 1999, Larson and Moir 1987, Moir and Carleton 1987, Northcutt 1978, Stuever and Hayden 1997a, USFS 1982, USFS 1985c

PINUS EDULIS - JUNIPERUS SPP. / ARTEMISIA TRIDENTATA WOODLAND

Two-needle Pinyon - Juniper species / Big Sagebrush Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This broadly defined woodland association is common in the Colorado Plateau, but also occurs on dry foothills and mesas from north-central New Mexico and southern Colorado west to the eastern Mojave Desert, in extreme northwestern Colorado and adjacent Utah. Elevations range from 1830-2440 m. Stands occur on gentle to moderately steep slopes on all aspects. The soils are generally poorly developed, coarse-textured and skeletal, and bare soil is common. Parent material includes sandstone and shale. The vegetation is characterized by a typically open tree canopy (10-30% cover, but ranges to 50% cover) that is codominated by *Pinus edulis* and *Juniperus* spp. The species of *Juniperus* varies with geography and elevation. *Juniperus monosperma* is common in north-central New Mexico and southern Colorado. *Juniperus osteosperma* is common from northwestern New Mexico west and north into Arizona and Utah. *Juniperus scopulorum* is more common in higher elevation stands. *Artemisia tridentata* dominates a sparse to moderately dense short-shrub layer (10-35% cover). *Purshia stansburiana* is typically absent or scarce. Other shrubs present may include *Amelanchier utahensis, Arctostaphylos patula, Cercocarpus montanus, Ephedra viridis, Gutierrezia sarothrae, Quercus gambelii*, or species of *Yucca* and *Opuntia*. Herbaceous cover is variable, but generally sparse and dominated by graminoids (<5% cover) with scattered forbs.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs contiguously across several square miles of the gently sloping mesas and high valleys at elevations between 5600 and 6000 feet. Aspect is southeasterly and soils are well-drained loamy sands.

Global Environment: This broadly defined woodland association is known from the Colorado Plateau, occurring on dry foothills and mesas from north-central New Mexico and southern Colorado west to the eastern Mojave Desert, and in extreme northwestern Colorado and adjacent Utah. Elevations range from 1830-2440 m. Stands occur on gentle to moderately steep slopes on all aspects. The soils are generally poorly developed, coarse-textured and skeletal. Bare soil is common. Parent material includes sandstone and shale.

VEGETATION DESCRIPTION

Zion National Park Vegetation: In the southeast corner of the park, old-growth or mature stands of *Pinus edulis* and *Juniperus osteosperma* contribute to a canopy cover of 20-50%. The shrub layer is sparse, only 5-15% cover and dominated by *Artemisia tridentata*. *Ephedra viridis* may codominate or is at least present. Other shrubs commonly present are *Amelanchier utahensis* and *Opuntia macrorhiza*. The herbaceous layer is of significance in this association. Grasses contribute up to 25% cover. *Bouteloua gracilis* and *Muhlenbergia pungens* are well represented. *Hesperostipa comata* is present in stands with open canopies. *Poa fendleriana* and the forbs *Artemisia dracunculus* and *Artemisia campestris* are commonly present. Where this association occurs near the park's East Entrance, the environment is less pristine. Trees are of a younger age class, and the herbaceous understory is primarily *Bromus tectorum*.

Global Vegetation: This woodland is characterized by a typically open tree canopy (10-30% cover, but ranges to 50% cover) that is codominated by *Pinus edulis* and *Juniperus* spp. The species of *Juniperus* varies with geography and elevation. *Juniperus monosperma* is common in north-central New Mexico and southern Colorado. *Juniperus osteosperma* is common from northwestern New Mexico, western Colorado, Arizona and Utah. *Juniperus scopulorum* is more common in higher elevation stands. *Artemisia tridentata* dominates a sparse to moderately dense short-shrub layer (10-35% cover). *Purshia stansburiana* is typically absent or scarce. Other shrubs present may include *Amelanchier utahensis, Arctostaphylos patula, Cercocarpus montanus, Ephedra viridis, Gutierrezia sarothrae, Quercus gambelii*, or species of *Yucca* and *Opuntia*. Herbaceous cover is variable, but is generally sparse and dominated by graminoids (<5% cover) with scattered forbs. Associated graminoids include *Achnatherum hymenoides (= Oryzopsis hymenoides), Bouteloua gracilis, Carex filifolia, Hesperostipa comata, Koeleria macrantha, Muhlenbergia torreyi, Pascopyrum smithii, Pleuraphis jamesii*, and *Poa fendleriana*. Forbs include species of *Cryptantha, Eriogonum, Penstemon*, and *Phlox*.

Global Dynamics: Stuever and Hayden (1997) described two phases of this plant community, a *Juniperus osteosperma* and a *Juniperus monosperma* phase. Both are restricted by its geographic range, and where the

Juniperus spp. are sympatric, *Juniperus osteosperma* generally occurs at high elevations. Fires in this association are thought to be infrequent because *Pinus edulis, Juniperus osteosperma, Juniperus monosperma*, and *Artemisia tridentata* are killed by burns and do not resprout (Wright et al. 1979). *Artemisia tridentata* will re-establish relatively quickly (about 10-20 years) if a seed source is nearby (Bunting 1987). However, *Pinus edulis, Juniperus osteosperma* and *Juniperus monosperma* are relatively slow to recover following fire, and sagebrush may dominate the sites for decades (Jameson et al. 1962, Erdman 1970). If fire-return intervals are more frequent than 10 years, then *Artemisia tridentata* has difficulty recovering (Bunting 1987, Everett 1987).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis*
SHORT SHRUB	*Amelanchier utahensis, Artemisia tridentata, Ephedra viridis, Opuntia macrorhiza*
GRAMINOID	*Bouteloua gracilis, Muhlenbergia pungens, Poa fendleriana*

Global

Stratum	Species
TREE CANOPY	*Juniperus monosperma, Juniperus osteosperma, Pinus edulis*
SHORT SHRUB	*Artemisia tridentata*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis*
SHORT SHRUB	*Artemisia tridentata, Ephedra viridis, Opuntia macrorhiza*
GRAMINOID	*Bouteloua gracilis, Muhlenbergia pungens*

Global

Stratum	Species
TREE CANOPY	*Pinus edulis*
SHORT SHRUB	*Artemisia tridentata*

GLOBAL SIMILAR ASSOCIATIONS:

- Juniperus osteosperma / Artemisia tridentata Woodland (CEGL000730)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs near the East Entrance and the southeast corner of the park.

Global Range: This woodland association is common on the Colorado Plateau, occurring from north-central New Mexico and southern Colorado west to the Mogollon Rim of Arizona and the eastern Mojave Desert, and in extreme northwestern Colorado and adjacent Utah.

Nations: US
States/Provinces: AZ CA? CO NM NV UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 43, 45, 48
Classification Confidence: 1 **Identifier:** CEGL000776
REFERENCES: Bourgeron and Engelking 1994, Bunting 1987, Dick-Peddie 1993, Driscoll et al. 1984, Erdman 1970, Everett 1987, Heinze et al. 1962, Isaacson 1967, Jameson et al. 1962, Johnston 1987, Larson and Moir 1987, Mason et al. 1967, Moir and Carleton 1987, Stuever and Hayden 1997a, Tiedemann 1978, USFS 1983a, USFS 1985a, USFS 1985e, Wright et al. 1979

PINUS EDULIS - JUNIPERUS SPP. / CERCOCARPUS MONTANUS WOODLAND

Two-needle Pinyon - Juniper species / Mountain-mahogany Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This broadly defined woodland association is common on the Colorado Plateau, occurring on dry foothills and mesas from north-central New Mexico and southern Colorado west to the Mogollon Rim of Arizona, and in extreme northwestern Colorado and adjacent Utah. Elevations range from 1830-2440 m. Stands occur on gentle to moderately steep slopes on all aspects. The soils are variable, but generally shallow, poorly developed and skeletal, ranging from clayey marl to sandy loam. Rock outcrop and bare soil are common. Parent materials include sandstone and shale. The vegetation is characterized by an open to moderately dense tree canopy (10-60% cover) codominated by *Pinus edulis* and *Juniperus* spp. The species of *Juniperus* varies with geography and elevation. *Juniperus monosperma* is common in north-central New Mexico and southern Colorado. *Juniperus deppeana* is common in southern New Mexico, and *Juniperus osteosperma* is common from northwestern New Mexico west into Arizona and north into western Colorado and Utah. *Juniperus scopulorum* is more common in higher elevation stands. *Cercocarpus montanus* dominates the moderately dense short-shrub layer (>25% cover). Other shrubs may be present including *Amelanchier* spp., *Ephedra viridis, Gutierrezia sarothrae, Fendlera rupicola, Garrya ovata, Mahonia* spp., *Nolina microcarpa, Quercus gambelii, Quercus grisea, Rhus trilobata*, or species of *Yucca* and *Opuntia*. Herbaceous cover is variable, ranging from sparse to moderately dense, and generally dominated by graminoids (>5% cover) with scattered forbs.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: Stands of *Pinus edulis – Juniperus* spp*. / Cercocarpus montanus* occur on gentle to steep slopes of mesa rims at elevations of 5800 to 7000 feet. The aspects of these slopes are most commonly eastern and northern, and occasionally western. The soils are shallow, clayey to loamy sand, and usually with high ground cover of shale rock fragments.

Global Environment: This broadly defined woodland association is common on the Colorado Plateau, occurring on dry foothills and mesas from north-central New Mexico and southern Colorado west to the Mogollon Rim of Arizona, and in extreme northwestern Colorado and adjacent Utah. Elevations range from 1830-2440 m. Stands occur on gentle to moderately steep slopes on all aspects. The soils are variable, but generally shallow, poorly developed and skeletal, ranging from clayey marl to sandy loam. Rock outcrop and bare soil are common. Parent materials include sandstone and shale.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Pinus edulis* and *Juniperus osteosperma* dominate the canopy layer with 20-40% cover and heights averaging 5 m. *Cercocarpus montanus* is present to well represented in the shrub layer and is usually codominated or sub-dominated by *Amelanchier utahensis*. *Quercus gambelii* is usually present and contributes significant cover at some sites. Herbaceous species commonly present with minimal cover are *Poa fendleriana, Carex rossii*, and *Achnatherum hymenoides*.

Global Vegetation: This association is characterized by an open to moderately dense tree canopy (10-60% cover) codominated by *Pinus edulis* and *Juniperus* spp. The species of *Juniperus* varies with geography and elevation. *Juniperus monosperma* is common in north-central New Mexico and southern Colorado. *Juniperus deppeana* is common in southern New Mexico, and *Juniperus osteosperma* is common from northwestern New Mexico west into Arizona and north into western Colorado and Utah. *Juniperus scopulorum* is more common in higher elevation stands. *Cercocarpus montanus* dominates the moderately dense short-shrub layer (>25% cover). Other shrubs may be present including *Amelanchier* spp., *Ephedra viridis, Gutierrezia sarothrae, Fendlera rupicola, Garrya ovata, Mahonia* spp., *Nolina microcarpa, Quercus gambelii, Quercus grisea, Rhus trilobata*, or species of *Yucca* and *Opuntia*. Herbaceous cover is variable, ranging from sparse to moderately dense, and generally dominated by graminoids (>5% cover) with scattered forbs. Associated graminoids include *Achnatherum hymenoides (= Oryzopsis hymenoides), Andropogon gerardii, Bouteloua curtipendula, Bouteloua gracilis, Bouteloua hirsuta, Carex rossii, Leymus salinus (= Elymus salinus), Hesperostipa comata, Koeleria macrantha, Muhlenbergia pauciflora, Pascopyrum smithii, Pleuraphis jamesii, Poa fendleriana, Pseudoroegneria spicata*, and *Schizachyrium scoparium*. Common forbs include species of *Cryptantha, Eriogonum, Penstemon* and *Phlox*.

Global Dynamics: Fires in this association are thought to be infrequent because *Pinus edulis, Juniperus osteosperma*, and *Juniperus monosperma* are killed or severely damaged by burns and do not resprout (Wright et al. 1979). *Cercocarpus montanus*, however, resprouts after burning and will re-establish relatively quickly (Bradley et al. 1992, Pase and Lindenmuth 1971). Conifers will re-establish more slowly. Stands occur in dry and often rocky habitats where fire frequency is low because of fuel discontinuity. When fire occurs, it will likely be severe because of greater fuel loads from decadent shrubs (Bradley et al. 1992).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis*
TALL SHRUB	*Amelanchier utahensis, Cercocarpus montanus, Quercus gambelii*

Global

Stratum	Species
TREE CANOPY	*Juniperus monosperma, Juniperus osteosperma, Pinus edulis*
TALL SHRUB	*Cercocarpus montanus*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis*
TALL SHRUB	*Cercocarpus montanus*

Global

Stratum	Species
TREE CANOPY	*Juniperus monosperma, Juniperus osteosperma, Pinus edulis*
TALL SHRUB	*Cercocarpus montanus*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled on high mesas of the East Rim from White Cliffs north to the source of the Virgin River, and above Camp Creek, north of the Kolob Canyons area.

Global Range: This widespread woodland association is found from southern Colorado and north-central New Mexico to the Mogollon Rim of Arizona, north across the Colorado Plateau into western Colorado and adjacent Utah.

Nations: US
States/Provinces: AZ CO NM OK? UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH81, 68, 308, 357
Classification Confidence: 2 **Identifier:** CEGL000780
REFERENCES: Baker 1983b, Baker 1984a, Baker and Kennedy 1985, Bourgeron and Engelking 1994, Bradley et al. 1992, Driscoll et al. 1984, Erdman 1962, Erdman 1969, Hess and Wasser 1982, Isaacson 1967, Johnston 1987, Kennedy 1983a, Larson and Moir 1987, Marr et al. 1979, Medina 1986, Moir 1963, Moir and Carleton 1987, Moir and Ludwig 1979, Pase and Lindenmuth 1971, Stuever and Hayden 1997a, USFS 1981a, USFS 1981b, USFS 1983a, USFS 1985d, USFS 1985e, USFS 1985g, Vories 1974, Wright et al. 1979

PINUS EDULIS - JUNIPERUS SPP. / QUERCUS GAMBELII WOODLAND

Two-needle Pinyon - Juniper species / Gambel Oak Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This widespread woodland association is known from the Colorado Plateau and southern Rocky Mountains, occurring from south-central Colorado to south-central New Mexico, west along the Mogollon Rim of Arizona, and north into Utah and western Colorado. Elevations normally range from 1580-2440 m, but may be higher in stands in southern New Mexico. Sites are variable, but generally are relatively mesic. Stands occur on flat to moderate slopes along drainages and on mesa tops, and on moderate to steep, rocky slopes of foothills, mountains and canyons, especially in draws where soil moisture is concentrated, on northern aspects or where shaded by upper canyon walls. The soils are variable and range from deep to shallow, silty clay to sandy loam, and often gravelly. Litter from *Quercus gambelii* and other shrubs is often extensive (over 50% cover). The vegetation is characterized by an open to moderately dense tree canopy (10-60% cover) codominated by *Pinus edulis* and *Juniperus* spp. The species of *Juniperus* varies with geography and elevation. *Juniperus monosperma* is common in north-central New Mexico and southern Colorado. *Juniperus deppeana* is common in southern New Mexico, and *Juniperus osteosperma* is common in northwestern New Mexico, northern Arizona and in Utah. *Juniperus scopulorum* is more common in higher elevation stands. An occasional *Pinus ponderosa* tree may be present in some stands. *Quercus gambelii* dominates the often patchy, moderately dense tall-shrub layer with at least 5% cover, but often over 25% cover. *Amelanchier utahensis, Cercocarpus montanus, Symphoricarpos oreophilus*, or species of *Yucca* and *Opuntia* are common shrub associates. Herbaceous cover is variable, ranging from sparse to moderately dense, but generally dominated by graminoids (>5% cover) with scattered forbs. Associated graminoids include *Achnatherum hymenoides (= Oryzopsis hymenoides), Bouteloua gracilis, Carex geyeri, Carex rossii, Elymus elymoides, Festuca arizonica, Koeleria macrantha, Muhlenbergia montana, Poa fendleriana*, and *Schizachyrium scoparium*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: Stands of *Pinus edulis – Juniperus* spp*. / Quercus gambelii* occur on flat to moderately steep slopes of mesas at elevations of 6000 to 7500 feet. The aspects of these slopes are generally eastern to southern, and occasionally western. The soils are mostly loamy sand and with greater than 50% litter cover.

Global Environment: This widespread woodland association is known from the Colorado Plateau and southern Rocky Mountains, occurring from south-central Colorado to south-central New Mexico, west along the Mogollon Rim of Arizona, and north into Utah and western Colorado. Elevations normally range from 1580-2440 m, but may be higher in stands in southern New Mexico. Sites are variable, but generally are relatively mesic. Stands occur on flat to moderate slopes along drainages and on mesa tops, and on moderate to steep, rocky slopes of foothills, mountains and canyons, especially in draws where soil moisture is concentrated, on northern aspects or where shaded by upper canyon walls. Stands may occur on any aspects, but are less common on hot south-facing slopes. The soils are variable and range from deep to shallow, silty clay to sandy loam, and are often gravelly. Litter from *Quercus gambelii* and other shrubs is often extensive (over 50% cover). Parent materials include sandstone, limestone and rhyolite.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Pinus edulis* and *Juniperus osteosperma* codominate this association with a total canopy cover of 20-40% and height averaging 5-10 m. In the northeast corner of the park, *Juniperus scopulorum* may occur. *Quercus gambelii* is the dominant shrub with minimum cover of 5%. Other shrubs commonly present or well represented are *Amelanchier utahensis, Cercocarpus montanus, Purshia tridentata, Peraphyllum ramosissimum, Artemisia tridentata*, and *Arctostaphylos patula*. Frequently occurring species in the understory are *Opuntia macrorhiza, Mahonia repens, Poa fendleriana, Helianthella uniflora*, and *Phlox austromontana*.

Global Vegetation: This widespread association is characterized by an open to moderately dense tree canopy (10-60% cover) codominated by *Pinus edulis* and *Juniperus* spp. The species of *Juniperus* varies with geography and elevation. *Juniperus monosperma* is common in north-central New Mexico and southern Colorado. *Juniperus deppeana* is common in southern New Mexico, and *Juniperus osteosperma* is common in northwestern New Mexico, northern Arizona and in Utah. *Juniperus scopulorum* is more common in higher elevation stands. An occasional *Pinus ponderosa* tree may be present is some stands. *Quercus gambelii* dominates the often patchy, moderately dense tall-shrub layer with at least 5% cover, but often over 25% cover. *Amelanchier utahensis, Cercocarpus montanus, Symphoricarpos oreophilus*, or species of *Yucca* and *Opuntia* are common shrub associates. Other shrubs, depending on geography, may include *Artemisia tridentata, Artemisia nova, Arctostaphylos patula, Cercocarpus ledifolius, Ephedra viridis, Fendlera rupicola, Gutierrezia sarothrae, Garrya* spp., *Ptelea trifoliata, Prunus* spp., *Quercus X pauciloba, Robinia neomexicana*, or *Rosa* spp. Herbaceous cover is variable, ranging from sparse to moderately dense, but generally dominated by graminoids (>5% cover) with scattered forbs. Associated graminoids include *Achnatherum hymenoides (= Oryzopsis hymenoides), Bouteloua gracilis, Carex geyeri, Carex rossii, Elymus elymoides, Festuca arizonica, Koeleria macrantha, Muhlenbergia montana, Poa fendleriana*, and *Schizachyrium scoparium*. Common forbs may include *Artemisia frigida, Balsamorhiza sagittata, Geranium caespitosum, Packera neomexicana, Thalictrum fendleri*, or *Vicia americana*.

Global Dynamics: *Quercus gambelii* is adapted to fire and will re-sprout profusely after a burn, forming a dense thicket (Wright 1972). *Pinus edulis, Juniperus monosperma, Juniperus osteosperma*, and *Juniperus scopulorum* are killed or severely damaged by fire and do not resprout after burning (Wright et al. 1979). When burned these woodlands will convert to oak shrublands. However, because *Juniperus deppeana* resprouts after burning, it will not be eliminated from the site (Bassett 1987, Wright 1972). Frequent burning will reduce cover of both *Quercus gambelii* and *Juniperus deppeana* (Erdman 1970, Kallender 1959).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis*
TALL SHRUB	*Amelanchier utahensis, Arctostaphylos patula, Cercocarpus montanus, Quercus gambelii*
GRAMINOID	*Poa fendleriana*

Global

Stratum	Species
TREE CANOPY	*Juniperus monosperma, Juniperus osteosperma, Juniperus scopulorum, Pinus edulis*
TALL SHRUB	*Amelanchier utahensis, Cercocarpus montanus, Quercus gambelii*
SHORT SHRUB	*Symphoricarpos oreophilus*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis*
TALL SHRUB	*Quercus gambelii*

Global

Stratum	Species
TREE CANOPY	*Juniperus deppeana, Juniperus monosperma, Juniperus osteosperma, Juniperus scopulorum, Pinus edulis*
TALL SHRUB	*Quercus gambelii*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on high mesas and plateaus on the eastern side of the park, from the southeast corner to Dakota Hill.

Global Range: This woodland association occurs in foothills and mesas from southern Colorado to south-central New Mexico, west along the Mogollon Rim of Arizona, and north into Utah and western Colorado.

Nations: US
States/Provinces: CO NM UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH31, RH79, 33, 34, 374, 371, 263, 211, 272, 265, 310
Classification Confidence: 2 **Identifier:** CEGL000791
REFERENCES: Bassett 1987, Bourgeron and Engelking 1994, Driscoll et al. 1984, Harmon 1980, Hess and Wasser 1982, Holm 1927, Isaacson 1967, Johnston 1987, Kallender 1959, Larson and Moir 1987, Marr et al. 1973b, Steinhoff 1978, Vories 1974, Wright 1972, Wright et al. 1979

PINUS EDULIS / CERCOCARPUS LEDIFOLIUS WOODLAND [PROVISIONAL]

Two-needle Pinyon / Curl-leaf Mountain-mahogany Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at 7900 feet on the west rim of the Upper Kolob Plateau. Soil texture is moderately deep clay.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association is known from only one location in Zion National Park, likely due to its high elevation and dry climate requirements. *Pinus edulis* is 5-10 m high and has foliar cover of less than 10%. It is codominated by *Cercocarpus ledifolius* in tree form. *Juniperus scopulorum* is present in the vicinity. The short-shrub layer is composed of the shrubs *Amelanchier utahensis, Cercocarpus montanus, Arctostaphylos patula*, and *Quercus gambelii*, having a combined foliar cover of 20%. Herbaceous cover is extremely sparse. Species present are *Achnatherum hymenoides, Poa fendleriana, Carex* spp., *Balsamorhiza sagittata*, and *Petradoria pumila*.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus scopulorum, Pinus edulis*
TALL SHRUB	*Cercocarpus ledifolius*
SHORT SHRUB	*Amelanchier utahensis, Arctostaphylos patula, Cercocarpus montanus*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus scopulorum, Pinus edulis*
TALL SHRUB	*Cercocarpus ledifolius*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is documented from the northern boundary of the park on a ridge north of Camp Creek. It may occur elsewhere in small stands along the northern boundary.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US
States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 120
Classification Confidence: **Identifier:** CEGL002940
REFERENCES:

II.A.4.N.a.45. PINUS MONOPHYLLA - (JUNIPERUS OSTEOSPERMA) WOODLAND ALLIANCE

Singleleaf Pinyon - (Utah Juniper) Woodland Alliance

PINUS MONOPHYLLA - JUNIPERUS OSTEOSPERMA / (SHEPHERDIA ROTUNDIFOLIA, AMELANCHIER UTAHENSIS) WOODLAND

Singleleaf Pinyon - Utah Juniper / (Roundleaf Buffaloberry, Utah Serviceberry) Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association appears to be related to more mesic sites than sites of *Pinus monophylla - Juniperus osteosperma / Quercus turbinella* Woodland (CEGL002941). Elevations range from 4500-5600 feet with slope aspects commonly north to east. Soils are sandy or, in some cases, clay or silt loams.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association has comparatively diverse species composition and moderate cover for upland pinyon-juniper vegetation types. *Juniperus osteosperma* and *Pinus monophylla* have combined foliar cover of over 20% and heights averaging 5 m. The indicator species of this association is *Shepherdia rotundifolia*. This species is always present, but has low cover. *Amelanchier utahensis* is commonly present, also with low cover. Other shrubs that may be present are *Quercus turbinella, Fraxinus anomala*, and *Rhus trilobata*. Subshrubs *Yucca* spp., *Opuntia* spp., and *Gutierrezia sarothrae* are nearly always present, but each species contributes less than 5% cover. Herbaceous species may include *Poa fendleriana, Hesperostipa comata, Pleuraphis jamesii*, with 5-30% cover, and a wide variety of forbs with minimal cover. (There have been situations where all species are present except *Shepherdia rotundifolia*, and classification is still appropriate. It is likely nearby.)

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
TALL SHRUB	*Amelanchier utahensis, Quercus turbinella, Shepherdia rotundifolia*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
TALL SHRUB	*Fraxinus anomala, Shepherdia rotundifolia*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on colluvial slopes of Zion Canyon, Parunaweep Canyon, Right and Left Fork of North Creek canyons, and Kolob Canyons of Zion National Park.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH63, RH64, RH69, 110, 131, 135, 140, 384, 520
Classification Confidence: 3 **Identifier:** CEGL002942
REFERENCES: None available.

PINUS MONOPHYLLA - JUNIPERUS OSTEOSPERMA / ARTEMISIA NOVA WOODLAND
Singleleaf Pinyon - Utah Juniper / Black Sagebrush Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This woodland association occurs in the Great Basin. Elevations range from 1830-2030 m (6000-6650 feet). Stands occur on mesas, hills and rocky ridges. Aspects are variable with southeast and northeast reported. Slopes are gentle to moderate. The soils are variable but typically shallow, fine-textured and lithic. Clay loams are common, but soil texture ranges to clay. Litter from trees may cover up to half the ground surface. Pavement is often high with 30-40% cover. Cover of rock or bare ground may also be significant (to 25%). The vegetation is characterized by an open to dense tree canopy (10-80% cover) typically codominated by *Pinus monophylla* and *Juniperus osteosperma*. The short-shrub layer is sparse to moderately dense (10-25% cover) and is dominated by *Artemisia nova*. *Chrysothamnus viscidiflorus* and *Gutierrezia sarothrae* are frequent associates. Other associated shrubs may include low cover of *Ephedra nevadensis, Ericameria nauseosa, Grayia spinosa*, and trace *Quercus gambelii*. The sparse to moderately dense herbaceous layer is dominated by graminoids with scattered forbs. Associated graminoids include *Achnatherum hymenoides (= Oryzopsis hymenoides), Elymus elymoides, Hesperostipa comata, Achnatherum thurberianum, Poa secunda*, and *Pseudoroegneria spicata ssp. inermis*. Although forb cover is generally sparse, it may be very diverse. Common forbs include *Cryptantha cinerea var. jamesii (= Cryptantha jamesii), Eriogonum caespitosum, Gilia ochroleuca, Lomatium foeniculaceum ssp. macdougalii (= Lomatium macdougalii)*, and *Sphaeralcea coccinea*. Disturbed stands may have high cover of the introduced annual grass *Bromus tectorum* or *Halogeton glomeratus*, an introduced forb.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at elevations above 6000 feet in clayey, rocky soils and gentle to moderate slopes.

Global Environment: This woodland is known from the Great Basin. Elevations range from 1830-2030 m (6000-6650 feet). Stands occur on mesas, hills and rocky ridges Aspects are variable with southeast and northeast reported. Slopes are gentle to moderate. The soils are variable but typically shallow, fine-textured and lithic. Clay loams are common, but soil texture ranges to clay. Litter from trees often covers up to half the ground surface. Pavement is often high with 30-40% cover. Cover of rock or bare ground may also be significant (to 25%).

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Juniperus osteosperma* dominates this association with 10-30% foliar cover and heights averaging 2-5 m. Subshrubs *Artemisia nova* and *Gutierrezia sarothrae* constitute the shrub layer. Their combined cover is sparse, competing with large basalt rock deposits for available soil. *Poa secunda* commonly occurs with minimal cover.

Global Vegetation: This plant association is characterized by an open to dense tree canopy (10-80% cover) typically codominated by *Pinus monophylla* and *Juniperus osteosperma*. The short-shrub layer is sparse to moderately dense (10-25% cover) and is dominated by *Artemisia nova*. *Chrysothamnus viscidiflorus* and *Gutierrezia sarothrae* are frequent associates. Other associated shrubs may include low cover of *Ephedra nevadensis, Ericameria nauseosa, Grayia spinosa*, and trace *Quercus gambelii*. The sparse to moderately dense herbaceous layer is dominated by graminoids with scattered forbs. Associated graminoids include *Achnatherum hymenoides (= Oryzopsis hymenoides), Elymus elymoides, Hesperostipa comata, Achnatherum thurberianum (= Stipa thurberiana), Poa secunda*, and *Pseudoroegneria spicata ssp. inermis*. Although forb cover is generally sparse, it may be very diverse. Common forbs include *Cryptantha cinerea var. jamesii (= Cryptantha jamesii), Eriogonum caespitosum, Gilia ochroleuca, Lomatium foeniculaceum ssp. macdougalii (= Lomatium macdougalii)*, and *Sphaeralcea coccinea*. Disturbed stands may have high cover of the introduced annual grass *Bromus tectorum* or *Halogeton glomeratus*, an introduced forb.

Global Dynamics: *Pinus monophylla* and *Juniperus osteosperma* trees are highly susceptible to fire because of highly flammable foliage, and they do not self-prune their dead branches. When burned these trees are usually killed or severely damaged and do not resprout. However, because these woodlands often have low tree density and lack fine fuel needed to spread ground fire, fire frequency is relatively low, needing extreme conditions to carry a crown fire (Bradley et al. 1992, Wright et al. 1979). *Artemisia nova* is easily killed by all fire intensities. It does not resprout and reestablishment is dependant on off-site seed sources (Wright et al. 1979). Fire frequency typically is very low because the sparse ground vegetation typically precludes the occurrence of fire and often acts as a natural firebreak.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma*
SHORT SHRUB	*Artemisia nova, Gutierrezia sarothrae*
GRAMINOID	*Elymus elymoides, Poa secunda*

Global

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
SHORT SHRUB	*Artemisia nova*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma*
SHORT SHRUB	*Artemisia nova*
GRAMINOID	*Poa secunda*

Global

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
SHORT SHRUB	*Artemisia nova*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on the mountain ridge between Timber Creek and the Hurricane Cliffs in the Kolob Canyons area and may occur infrequently in small stands on mesas or basalt outcrops in the northern region of the park.

Global Range: This Great Basin woodland association is reported from Nevada, southwestern Utah, California, and southern Idaho.

Nations: US
States/Provinces: CA ID NV UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 58
Classification Confidence: 1 **Identifier:** CEGL000831
REFERENCES: Blackburn et al. 1968c, Blackburn et al. 1969c, Blackburn et al. 1969d, Bourgeron and Engelking 1994, Bradley et al. 1992, Driscoll et al. 1984, Ostler et al. 2000, Wright et al. 1979

PINUS MONOPHYLLA - JUNIPERUS OSTEOSPERMA / ARTEMISIA TRIDENTATA WOODLAND

Singleleaf Pinyon - Utah Juniper / Big Sagebrush Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This woodland association occurs in the Great Basin. Elevations range from 1220-2300 m (4000-7550 feet). Stands occur on mesas, hills and rocky ridges on gentle to steep slopes on all aspects. The soils are shallow to moderately deep, calcareous, lithic loams or clays. The vegetation is characterized by an open to moderately dense tree canopy (10-40% cover) typically codominated by *Pinus monophylla* and *Juniperus osteosperma*. *Juniperus osteosperma* is often more abundant at lower elevation. The short-shrub layer is typically sparse (10-15% cover) and is dominated by *Artemisia tridentata*. *Chrysothamnus viscidiflorus* or *Purshia tridentata* are frequent associates. Other associated shrubs may include low cover of *Amelanchier* spp., *Ephedra nevadensis, Ephedra viridis, Ericameria nauseosa, Grayia spinosa*, and species of *Gutierrezia, Opuntia, Tetradymia*, and *Yucca*. The sparse to moderately dense herbaceous layer is dominated by graminoids with scattered forbs. Frequent graminoids are *Elymus elymoides* and *Poa secunda*. Although forb cover is generally sparse, it may be very diverse. Frequent forbs include species of *Astragalus, Balsamorhiza, Machaeranthera, Eriogonum*, and *Phlox*. Disturbed stands may have high cover of the introduced annual grass *Bromus tectorum*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: Stands of *Pinus monophylla - Juniperus osteosperma / Artemisia tridentata* occur at an elevation of around 4000 feet on gentle to moderate slopes and sandy loam soils.

Global Environment: This woodland association occurs in the Great Basin. Elevations range from 1220-2300 m (4000-7550 feet). Stands occur on mesas, hills and rocky ridges on gentle to steep slope on all aspects. The soils are shallow to moderately deep, calcareous, lithic loams or clays. Litter from trees may cover up to half the ground surface (30-55%). Cover of rock (about 10%), pavement (10-25%), and bare ground (10-20%) are generally less.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Juniperus osteosperma* and *Pinus monophylla* codominate the canopy layer with less than 30-60% cover. Tree canopy height ranges 2-5 m. *Artemisia tridentata* dominates the shrub layer, but is usually sparse with 10-20% foliar cover. Other shrubs present in this association may include *Amelanchier utahensis, Ephedra nevadensis*, and *Ephedra viridis*. Subshrubs *Gutierrezia* spp., *Opuntia* spp., and *Yucca* spp. are commonly present with minimal cover. *Bromus tectorum* is present to abundant where this association occurs. Other graminoids that may be present are *Pleuraphis jamesii* and *Elymus elymoides*.

Global Vegetation: The vegetation is characterized by an open to moderately dense tree canopy (10-40% cover) typically codominated by *Pinus monophylla* and *Juniperus osteosperma*. *Juniperus osteosperma* is often more abundant at lower elevation. The short-shrub layer is typically sparse (10-15% cover) and is dominated by *Artemisia tridentata*. *Chrysothamnus viscidiflorus* or *Purshia tridentata* are frequent associates. Other associated shrubs may include low cover of *Amelanchier* spp., *Ephedra nevadensis, Ephedra viridis, Ericameria nauseosa, Grayia spinosa*, and species of *Gutierrezia, Opuntia, Tetradymia* and *Yucca*. The sparse to moderately dense herbaceous layer is dominated by graminoids with scattered forbs. Frequent graminoids are *Elymus elymoides* and *Poa secunda*. Other associated graminoids may include *Achnatherum hymenoides (= Oryzopsis hymenoides), Achnatherum thurberianum (= Stipa thurberiana), Koeleria macrantha, Pleuraphis jamesii*, or *Pseudoroegneria spicata*. Although forb cover is generally sparse, it may be very diverse. Common forbs include *Astragalus* spp., *Balsamorhiza sagittata, Cryptantha cinerea var. jamesii (= Cryptantha jamesii), Lomatium* spp., *Machaeranthera canescens, Eriogonum* spp., *Gayophytum ramosissimum*, and *Phlox* spp. Disturbed stands may have high cover of the introduced annual grass *Bromus tectorum*.

Global Dynamics: *Pinus monophylla* and *Juniperus osteosperma* trees and *Artemisia tridentata* are highly susceptible to fire because of highly flammable foliage, and they do not self-prune their dead branches. When burned they are killed or severely damaged and do not resprout. *Artemisia tridentata* will re-establish relatively quickly (about 10-20 years), if a seed source is nearby (Barney and Frischknecht 1974, Bunting 1987, Wright et al. 1979). However, *Pinus monophylla* and *Juniperus osteosperma* are relatively slow to recover following fire, and sagebrush may dominate the burned sites for decades (Jameson et al. 1962). If fire-return intervals are more frequent than 10 years, then *Artemisia tridentata* has difficulty recovering (Bunting 1987, Everett 1987).

This community may be increasing in extent by invading adjacent grasslands and steppe because of reduction of fire frequency due to fire suppression and fine fuels removal by grazing livestock that would allow fires to spread (Blackburn 1967, Johnson and Payne 1968). Fire, drought and competition with grasses are thought to have kept *Juniperus* spp. communities restricted to rocky areas that do not burn frequently (Wright et al. 1979). When understory is more continuous, fires will be more frequent. The invasion of *Bromus tectorum* across the western U.S. is changing fire frequencies by providing a continuous layer of fine fuel. However, these woodlands often have low tree density, and if they lack fine fuel needed to spread ground fire, fire frequency is relatively low, needing extreme conditions to carry a crown fire (Bradley et al. 1992, Wright et al. 1979).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
TALL SHRUB	*Amelanchier utahensis, Artemisia tridentata, Ephedra* spp.
SHORT SHRUB	*Gutierrezia* spp., *Opuntia* spp., *Yucca* spp.
GRAMINOID	*Bromus tectorum*

Global

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
TALL SHRUB	*Artemisia tridentata*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
TALL SHRUB	*Artemisia tridentata*

Global

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis*
TALL SHRUB	*Artemisia tridentata*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs in small stands in sandy washes, alluvial benches and interfluves in the southwestern region of the park.

Global Range: This Great Basin association is known from Nevada and Utah.

Nations: US
States/Provinces: NV UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH2, RH12, RH85, RH87, RH88, 386
Classification Confidence: 2 **Identifier:** CEGL000832
REFERENCES: Barney and Frischknecht 1974, Blackburn 1967, Blackburn et al. 1968a, Blackburn et al. 1969b, Blackburn et al. 1969c, Bourgeron and Engelking 1994, Bradley et al. 1992, Bunting 1987, Driscoll et al. 1984, Everett 1987, Johnson and Payne 1968, Koniak 1985, Ostler et al. 2000, Wright et al. 1979

PINUS MONOPHYLLA - JUNIPERUS OSTEOSPERMA / CERCOCARPUS MONTANUS - QUERCUS GAMBELII WOODLAND [PROVISIONAL]

Singleleaf Pinyon - Utah Juniper / Mountain-mahogany - Gambel Oak Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on gentle to moderately steep mountain ridge slopes and low colluvial slopes. Elevations range from 4600 to 6300 feet. Soil texture was not documented, but is likely to be sandy or clay loam. Slope aspects are variable. Ground cover is mostly litter with some small and large rocks.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Pinus monophylla* and *Juniperus osteosperma* constitute the canopy layer with 20-50% cover. Lack of *Quercus turbinella* distinguishes this association from the more widely distributed pinyon-juniper woodlands with a mixed montane shrub layer. *Cercocarpus montanus, Quercus gambelii*, and *Amelanchier utahensis* are the dominant shrubs in this association and at least two of these shrubs are present. Total shrub cover ranges from 10-70%. Common herbaceous species present are *Poa fendleriana* and *Cordylanthus* spp.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
TALL SHRUB	*Amelanchier utahensis, Cercocarpus montanus, Quercus gambelii*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
TALL SHRUB	*Amelanchier utahensis, Cercocarpus montanus, Quercus gambelii*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs in the Kolob Arch quadrangle and extensively on eastern slopes of Black Ridge.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 136. AA Plots: 46, 349, 367, 369, 370, 372, 376, 384, 387, 389, 391, 395, 446, 450, 451, 453, 454, 455, 456, 457, 459, 460, 462, 463, 466, 467, 469, 470, 471, 474, 475, 476, 477
Classification Confidence: 3 **Identifier:** CEGL002968
REFERENCES: None available.

PINUS MONOPHYLLA - JUNIPERUS OSTEOSPERMA / COLEOGYNE RAMOSISSIMA WOODLAND [PROVISIONAL]

Singleleaf Pinyon - Utah Juniper / Blackbrush Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: Stands of *Pinus monophylla - Juniperus osteosperma / Coleogyne ramosissima* occur on gentle to moderate sandy slopes at elevations below 4500 feet.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Pinus monophylla* dominates the tree layer in this association with cover of 20% and average height of 5 m. *Juniperus osteosperma* is present or may be codominant. *Coleogyne ramosissima* dominates the shrub layer and is accompanied by *Purshia tridentata, Artemisia tridentata, Ephedra nevadensis*, and *Opuntia macrorhiza*, all of minimal cover. The herbaceous layer is absent.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
TALL SHRUB	*Coleogyne ramosissima, Purshia tridentata*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
TALL SHRUB	*Coleogyne ramosissima*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on the southwest corner of the park, specifically Springdale West quadrangle and southern low-elevation regions of the Springdale East quadrangle.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 503 & multiple AA points
Classification Confidence: 3 **Identifier:** CEGL002971
REFERENCES: None available.

PINUS MONOPHYLLA - JUNIPERUS OSTEOSPERMA / GUTIERREZIA SAROTHRAE / PLEURAPHIS JAMESII WOODLAND [PROVISIONAL]

Singleleaf Pinyon - Utah Juniper / Snakeweed / James' Galleta Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on gentle to moderate slopes with mostly southeastern aspects. Elevation ranges 4200 to 4600 feet. Soil texture was not documented for this association, but it is known that this area has a clay texture to its soils. Ground cover of litter and small rocks are less than 50%, leaving 50% bare ground.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Pinus monophylla* and *Juniperus osteosperma* constitute the tree layer with cover of 20-50%. *Gutierrezia sarothrae* is always present in a short shrub layer with an average 10% cover. A taller shrub layer, if present, has 10% cover, and commonly includes *Psorothamnus fremontii, Salvia dorrii*, and *Ephedra viridis*. The perennial grass *Pleuraphis jamesii* typically has 10% cover and may be codominant with *Aristida purpurea* and *Bromus tectorum*. This type is distinguished from *Pinus monophylla - Juniperus osteosperma / Coleogyne ramosissima* Woodland by the lack of *Coleogyne ramosissima*.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
TALL SHRUB	*Psorothamnus fremontii*
DWARF SHRUB	*Gutierrezia sarothrae*
GRAMINOID	*Aristida purpurea, Bromus tectorum, Pleuraphis jamesii*

Global

Stratum	Species

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
DWARF SHRUB	*Gutierrezia sarothrae*
GRAMINOID	*Pleuraphis jamesii*

Global

Stratum	Species

Information not available.

GLOBAL SIMILAR ASSOCIATIONS:

Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on the Coalpits Plateau in vicinity of the Chinle Trail.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: AA Plots: 154, 155, 156, 162, 224, 229,230, 515. This association was not sampled in collection of plot data, but only observed during the Accuracy Assessment phase of project.
Classification Confidence: 3 **Identifier:** CEGL002970
REFERENCES: None available.

PINUS MONOPHYLLA - JUNIPERUS OSTEOSPERMA / HESPEROSTIPA COMATA WOODLAND
Singleleaf Pinyon - Utah Juniper / Needle-and-Thread Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on flat plateaus and steep colluvial slopes with commonly southern to southwestern aspects. Soil texture is sandy. Elevation ranges from 4000 to 5800 feet.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Pinus monophylla* and *Juniperus osteosperma* dominate the canopy layer with 20-40% cover. The shrub layer cover is less than 15%. Common shrubs that may occur are *Quercus turbinella, Amelanchier utahensis, Shepherdia rotundifolia, Ephedra viridis, Ericameria nauseosa*, and the dwarf-shrub *Gutierrezia sarothrae*. *Hesperostipa comata* is dominant in the herbaceous layer with 10-50% cover. Other graminoids that may codominate or sub-dominate are *Poa fendleriana, Bouteloua gracilis, Bouteloua eriopoda, Aristida purpurea, Bromus tectorum*, and *Muhlenbergia pungens*.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
GRAMINOID	*Hesperostipa comata*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
GRAMINOID	*Hesperostipa comata*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments:

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs in various locations south of Highway 9 that bisects the park.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: AA Plots: 2, 3, 14, 31, 34, 39, 111, 220, 222, 250
Classification Confidence: 3 **Identifier:** CEGL002969
REFERENCES: None available.

PINUS MONOPHYLLA - JUNIPERUS OSTEOSPERMA / QUERCUS TURBINELLA WOODLAND
Singleleaf Pinyon - Utah Juniper / Turbinella Live Oak Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at elevations of 4000 to 6000 feet on gentle to moderately steep colluvial slopes and hillsides throughout the western side of the park. Slope aspect is generally eastern to southern. Some sites with northern aspects have been documented in Zion Canyon. Soils are sandy loam.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: In this association, *Juniperus osteosperma* and *Pinus monophylla* codominate with 20-60% cover. Tree canopy height averages 5 m. *Quercus turbinella*, with cover of 5-50%, dominates or codominates the shrub layer with a mixture of shrubs. Other shrubs that are commonly well represented are *Amelanchier utahensis, Arctostaphylos patula*, and *Cercocarpus montanus*. Shrubs that may be present with less cover are *Arctostaphylos pungens, Purshia stansburiana, Purshia tridentata, Fraxinus anomala*, and *Quercus gambelii*. Subshrubs *Gutierrezia sarothrae, Opuntia* spp., and *Yucca* spp. are usually present with minimal cover. Herbaceous cover is minimal and inconsistent. The most commonly found forbs and graminoids are *Heterotheca villosa, Arenaria fendleri, Penstemon* spp., *Bromus tectorum*, and *Poa fendleriana*.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
TALL SHRUB	*Amelanchier utahensis, Arctostaphylos patula, Quercus turbinella*
SHORT SHRUB	*Gutierrezia sarothrae, Opuntia* spp., *Yucca* spp.

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*
TALL SHRUB	*Quercus turbinella*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: Singleleaf pinyon woodland associations are restricted to the western side of the park including Zion and Parunaweep canyons. *Pinus monophylla - Juniperus osteosperma / Quercus turbinella* Woodland is distributed abundantly in the Kolob Canyons, the Right and Left Fork of North Creek, Zion Canyon, Coalpits and Parunaweep Canyon. It is also found on the low-elevation mesa tops in the southwest region of the park.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH14, RH39, RH42, RH43, 3, 6, 42, 112
Classification Confidence: 3 **Identifier:** CEGL002941
REFERENCES: None available.

PINUS MONOPHYLLA - JUNIPERUS OSTEOSPERMA / SPARSE UNDERSTORY WOODLAND
Singleleaf Pinyon - Utah Juniper / Sparse Understory Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This widespread woodland association is known from the Great Basin and northern Mojave Desert. Elevations normally range from 1370-2135 m (4500-7000 feet). Stands occur on flat to moderately sloping sites on all aspects. The soils are variable, but typically shallow and lithic. Litter from trees often covers about half the ground surface. Cover of rock, pavement or bare ground may also be significant depending on the site. The vegetation is characterized by an open to moderately dense tree canopy (10-40% cover) dominated by *Pinus monophylla* without a significant understory. *Juniperus osteosperma* may be present to codominant. Shrub cover, if present, is sparse (<10% cover). *Artemisia tridentata, Purshia tridentata*, and *Chrysothamnus viscidiflorus* are most consistent. Other shrubs include *Amelanchier* spp., *Eriogonum microthecum, Cercocarpus montanus, Gutierrezia sarothrae, Purshia tridentata, Quercus gambelii, Quercus turbinella*, and species of *Opuntia*. Herbaceous cover is typically sparse and dominated by perennial graminoids with scattered forbs.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at elevations ranging from 4500 to 6500 feet on all aspects of ridges, slopes, and alluvial fan deposits. Soil substrates are gravelly, rocky, or highly weathered clays at these sites.

Global Environment: This widespread woodland association is known from the Great Basin and northern Mojave Desert. Elevations normally range from 1370-2135 m (4500-7000 feet). Stands occur on flat to moderately sloping sites on all aspects. The soils are variable, but typically shallow and lithic. Litter from trees often covers about half the ground surface. Cover of rock, pavement or bare ground may also be significant depending on the site.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Stands of *Pinus monophylla - Juniperus osteosperma* Woodland with sparse understory are scattered throughout the western region of the park. Gravelly, rocky, and weathered clays are typical of the soil substrate where this type exists. *Juniperus osteosperma* commonly has higher cover than *Pinus monophylla*. Their combined cover is 20-40%. Shrub cover is very sparse, less than 10%, and most commonly composed of *Quercus turbinella, Quercus gambelii, Amelanchier utahensis*, and *Cercocarpus montanus*. Subshrubs *Opuntia* spp. and *Gutierrezia sarothrae* are nearly always present with minimal cover. Common herbaceous species are *Pleuraphis jamesii, Bromus tectorum, Aristida purpurea, Hesperostipa comata*, and *Poa fendleriana*.

Global Vegetation: The vegetation is characterized by an open to moderately dense tree canopy (10-40% cover) dominated by *Pinus monophylla* without a significant understory. *Juniperus osteosperma* may be present to codominant. Shrub cover, if present, is sparse (<10% cover). *Artemisia tridentata, Purshia tridentata*, and *Chrysothamnus viscidiflorus* are most consistent. Other shrubs include *Amelanchier* spp., *Eriogonum microthecum, Cercocarpus montanus, Gutierrezia sarothrae, Purshia tridentata, Quercus gambelii, Quercus turbinella*, and species of *Opuntia*. Herbaceous cover is typically sparse and dominated by graminoids with scattered forbs. Associated graminoids include *Achnatherum hymenoides (= Oryzopsis hymenoides), Bouteloua gracilis, Leymus cinereus (= Elymus cinereus), Elymus elymoides, Hesperostipa comata, Achnatherum thurberianum (= Stipa thurberiana), Poa fendleriana*, or *Poa secunda*. Although forb cover is generally sparse, it may be diverse. Common forbs include *Comandra umbellata ssp. pallida (= Comandra pallida), Cryptantha cinerea var. jamesii (= Cryptantha jamesii)*, and species of *Astragalus, Eriogonum*, and *Phlox*.

Global Dynamics: *Pinus monophylla* and *Juniperus osteosperma* trees are highly susceptible to fire because of highly flammable foliage, and they do not self-prune their dead branches. When burned these trees are usually killed or severely damaged and do not resprout. However, because these woodlands often have an open canopy and sparse understory and lack fine fuels needed to spread ground fire, fire frequency is relatively low, needing extreme conditions (high winds) to carry a crown fire (Bradley et al. 1992, Wright et al. 1979).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*

Global

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*

Global

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus monophylla*

GLOBAL SIMILAR ASSOCIATIONS:

- Pinus monophylla Woodland (CEGL000825)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: This pinyon-juniper type may have several shrub species but all occur in small amounts usually totaling less than 10% cover.

ELEMENT DISTRIBUTION

Zion National Park Range: Singleleaf pinyon woodland associations are restricted to the western side of the park and Zion and Parunaweep canyons. *Pinus monophylla - Juniperus osteosperma* Woodland is widespread in this area and occurs on mid-elevation colluvial slopes, ridges, and alluvial fan deposits west of the Kolob Canyons and south along the western boundary of the park.

Global Range: This woodland association occurs in the Great Basin and northern Mojave Desert.

Nations: US
States/Provinces: CA NV UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH01, RH13, RH52, 59, 130, 137, 141
Classification Confidence: 2 **Identifier:** CEGL000829
REFERENCES: Armstrong 1969, Blackburn 1967, Blackburn et al. 1968a, Blackburn et al. 1968c, Blackburn et al. 1969c, Blackburn et al. 1969d, Blackburn et al. 1969e, Bourgeron and Engelking 1994, Bradley et al. 1992, Driscoll et al. 1984, Heinze et al. 1962, Peterson 1984, Sawyer and Keeler-Wolf 1995, Wright et al. 1979

II.A.4.N.a.32. PINUS PONDEROSA WOODLAND ALLIANCE

Ponderosa Pine Woodland Alliance

PINUS PONDEROSA / ARCTOSTAPHYLOS PATULA WOODLAND

Ponderosa Pine / Greenleaf Manzanita Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This woodland association has been reported from the mountains and plateaus in Colorado, Utah and California. Elevation ranges from 1770-2600 m (5800-8500 feet). Sites are dry, warm, mid to lower slopes, benches and ridges often with southerly aspects. Soils are typically sandy loams but vary from sand to silt loam. Parent materials are sandstone, limestone and occasionally basalt and andesite. The tree canopy is typically open (about 30% cover), but can range from 10-80% cover and is dominated by *Pinus ponderosa*. Scattered *Juniperus scopulorum* trees may also be present. *Arctostaphylos patula* dominates the moderate to sparse shrub layer. Others shrub species present may include *Amelanchier utahensis, Ceanothus* spp., *Cercocarpus montanus, Mahonia repens, Purshia tridentata, Quercus gambelii, Symphoricarpos oreophilus*, and *Tetradymia canescens*. The sparse herbaceous layer (<20% cover) is primarily composed of graminoids such as *Carex rossii, Achnatherum hymenoides (= Oryzopsis hymenoides), Elymus elymoides, Leymus salinus (= Elymus salinus)*, and *Poa fendleriana*. Forbs are sparse and may include *Achillea millefolium, Balsamorhiza sagittata*, and *Eriogonum racemosum*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on gentle to moderate slopes of various aspects at elevations between 5600 and 8000 feet. It is found on high mesa tops, plateaus and Navajo sandstone formation benches and basins. Soil texture is sandy loam with moderate cover of pine needle duff.

Global Environment: This woodland association has been reported from the Colorado Plateau and eastern Sierra Nevada from mountains and plateaus in Colorado, Utah and California. Elevation ranges from 1770-2600m (5800-8500 feet). Sites are dry, warm, mid to lower slopes, benches and ridges often with southerly aspects. Soils are typically sandy loams but vary from sand to silt loam. Parent materials are sandstone, limestone and occasionally basalt and andesite.

VEGETATION DESCRIPTION

Zion National Park Vegetation: In this association, *Pinus ponderosa* dominates the tree canopy with 20-70% cover and heights 15-20 m. *Arctostaphylos patula* is always present with at least 10% cover. Various combinations of *Amelanchier utahensis, Quercus gambelii, Cercocarpus montanus, Quercus turbinella*, and *Purshia tridentata* are also present. Shrubs contribute 20-50% cover. Herbaceous cover is commonly minimal. It may be extensive when shrub cover is very low and the association occurs in a gently sloping drainage. Herbaceous species often occurring are *Heterotheca villosa, Elymus elymoides, Poa pratensis, Muhlenbergia pungens, Bouteloua gracilis*, and *Poa fendleriana*. This association is often found adjacent to *Pinus ponderosa* Slickrock Sparse Vegetation and *Cercocarpus intricatus* Slickrock Sparse Vegetation.

Global Vegetation: This woodland association is characterized by a tree canopy that is typically open (about 30% cover), but can range from 10-80% cover and is dominated by *Pinus ponderosa*. Scattered *Juniperus scopulorum* trees may also be present. *Arctostaphylos patula* dominates the moderate to sparse shrub layer. Others shrub species present may include *Amelanchier utahensis, Ceanothus* spp., *Cercocarpus montanus, Mahonia repens, Purshia tridentata, Quercus gambelii, Symphoricarpos oreophilus*, and *Tetradymia canescens*. The sparse herbaceous layer (<20% cover) is primarily composed of graminoids such as *Carex rossii, Achnatherum hymenoides (= Oryzopsis hymenoides), Elymus elymoides, Leymus salinus (= Elymus salinus)*, and *Poa fendleriana*. Forbs are sparse and may include *Achillea millefolium, Balsamorhiza sagittata*, and *Eriogonum racemosum*.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Pinus ponderosa*
TALL SHRUB	*Arctostaphylos patula*

Global

Stratum	Species
TREE CANOPY	*Juniperus scopulorum, Pinus ponderosa*
SHORT SHRUB	*Arctostaphylos patula*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus osteosperma, Pinus edulis, Pinus ponderosa*
TALL SHRUB	*Amelanchier utahensis, Arctostaphylos patula, Cercocarpus montanus, Purshia tridentata, Quercus gambelii, Quercus turbinella*

Global

Stratum	Species
TREE CANOPY	*Pinus ponderosa*
SHORT SHRUB	*Arctostaphylos patula*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: This plant association is seral in California.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is widespread at the higher elevations in Zion National Park, specifically at Langston Mountain, Horse Pasture Plateau, Lower Kolob Terrace, Dakota Hill, Jolly Gulch, and the southeast Navajo sandstone region of the park.

Global Range: This coniferous woodland association has been reported from the Colorado Plateau and eastern Sierra Nevada.

Nations: US
States/Provinces: CA? CO UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH59, RH80, 31, 44, 72, 208
Classification Confidence: 2 **Identifier:** CEGL000842
REFERENCES: Bourgeron and Engelking 1994, Driscoll et al. 1984, Graybosch and Buchanan 1983, Johnston 1987, Roberts et al. 1992, Youngblood and Mauk 1985

PINUS PONDEROSA / ARTEMISIA NOVA WOODLAND

Ponderosa Pine / Black Sagebrush Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This woodland association is found in the mountains and plateaus in southern Utah. Stands occur on gentle lower slopes and benches with various aspects. Elevation ranges from 2340-2750 m (7660-9000 feet). Substrates are typically shallow, gravelly loam or silt loam soils derived from basalt. The tree canopy is open (10-30% cover) and is dominated by *Pinus ponderosa*. Scattered *Juniperus scopulorum* or *Pinus flexilis* trees may also be present. *Artemisia nova* or *Artemisia arbuscula* dominates the typically sparse dwarf-shrub layer. Others shrub species present may include *Purshia tridentata, Chrysothamnus viscidiflorus, Ericameria parryi, Gutierrezia sarothrae, Quercus gambelii*, and *Tetradymia canescens*. The sparse herbaceous layer (<20% cover) is primarily composed of graminoids with scattered forbs.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at elevations ranging 6900 to 7900 feet on volcanic rock, clay soils, and gentle slopes.

Global Environment: This woodland association is known from the mountains and plateaus in southern Utah. Stands occur on gentle lower slopes and benches with various aspects. Elevation ranges from 2340-2750 m (7660-9000 feet). Substrates are typically shallow, gravelly loam or silt loam soils derived from basalt, often with an impermeable subsurface horizon that restricts rooting. Some sites are known to have seasonally high water tables.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Pinus ponderosa* dominates this association with 10-30% cover. *Artemisia nova* has 10-20% cover and is evenly distributed in the stand. Clumps of *Quercus gambelii* are scattered and contribute less than 10% cover. Herbaceous species contribute minimal cover. Prominent species are *Carex rossii, Elymus elymoides*, and *Poa secunda*. Dense stands of *Quercus gambelii* occur adjacent to this association.

Global Vegetation: This association is characterized by an open tree canopy (10-30% cover) that is dominated by *Pinus ponderosa*. Scattered *Juniperus scopulorum* or *Pinus flexilis* trees may also be present. *Artemisia nova* or *Artemisia arbuscula* dominates the typically sparse dwarf-shrub layer. Others shrub species present may include *Purshia tridentata, Chrysothamnus viscidiflorus, Ericameria parryi, Gutierrezia sarothrae, Quercus gambelii*, and *Tetradymia canescens*. The sparse herbaceous layer (<20% cover) is primarily composed of graminoids with scattered forbs such as *Achnatherum hymenoides, Bouteloua gracilis, Carex rossii, Elymus elymoides, Leymus salinus (= Elymus salinus), Piptatherum micranthum, Poa fendleriana, Poa secunda, Eriogonum alatum, Eriogonum racemosum, Opuntia* spp., and *Penstemon caespitosus*.

Global Dynamics: These woodlands are thought to have a longer fire-return interval than other *Pinus ponderosa*-dominated woodlands because of the presence of *Artemisia nova*, which is easily killed by all fire intensities (Roberts et al. 1992). *Artemisia nova* does not sprout after burning; sites must be re-established by seed from off-site plants. However, the typically sparse cover of most black sagebrush occurrences precludes the occurrence of fire and may act as natural firebreaks (FEIS 2001).

When exposed to fire, West and Hassan (1985) found no evidence of *Artemisia nova* re-establishment up to 2 years following a late-July fire. Most black sagebrush seeds are dispersed close to the parent plant; therefore, mosaic burning patterns which leave unburned patches speed recovery. Favorable precipitation following burning also aids in seedling establishment (Wright et al. 1979).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Pinus ponderosa*
TALL SHRUB	*Quercus gambelii*
DWARF SHRUB	*Artemisia nova*
GRAMINOID	*Carex rossii, Elymus elymoides, Poa secunda*

Global

Stratum	Species
TREE CANOPY	*Pinus ponderosa*
DWARF SHRUB	*Artemisia nova*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Pinus ponderosa*
DWARF SHRUB	*Artemisia nova*

Global

Stratum	Species
TREE CANOPY	*Pinus ponderosa*
DWARF SHRUB	*Artemisia nova*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on the Upper and Lower Kolob plateaus of the northern part of Zion National Park.

Global Range: This association occurs in the mountains and plateaus in southern Utah.

Nations: US
States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 89. AA plots: 317 (possibly a few more)
Classification Confidence: 2 **Identifier:** CEGL000846
REFERENCES: Bourgeron and Engelking 1994, Driscoll et al. 1984, Johnston 1987, Roberts et al. 1992, West and Hassan 1985, Wright et al. 1979, Youngblood and Mauk 1985

PINUS PONDEROSA / BROMUS INERMIS SEMI-NATURAL WOODLAND

Ponderosa Pine / Smooth Brome Semi-natural Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on a gently eastern sloping drainage of Horse Pasture plateau on moderately well-drained sandy loam soil. Elevation is 6700 feet.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Spring snowmelt provides seasonally saturated soils in the shallow and wide drainage of Corral Hollow setting up favorable conditions for 40% cover of *Bromus inermis* and presence of *Poa pratensis*. Mature *Pinus ponderosa* solely represents the tree canopy with over 20% cover and heights of over 20 m. Other characteristic species present are *Heterotheca villosa, Lupinus argenteus, Lotus utahensis*, and *Achillea millefolium*.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Pinus ponderosa*
GRAMINOID	*Bromus inermis*

Global

Stratum	Species

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Pinus ponderosa*
GRAMINOID	*Bromus inermis, Poa pratensis*
FORB	*Heterotheca villosa, Lotus utahensis, Lupinus argenteus*

Global

Stratum	Species

Information not available.

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association has been documented in Corral Hollow on Horse Pasture Plateau and observed on the East Rim of Zion National Park.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 97
Classification Confidence: 3 **Identifier:** CEGL002943
REFERENCES: None available.

PINUS PONDEROSA / PTERIDIUM AQUILINUM WOODLAND [PROVISIONAL]

Ponderosa Pine / Northern Bracken Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: Small stream channels meander through Pine Valley from the Upper Kolob Plateau feeding ponderosa pine woodlands and grassland meadows at an elevation of 6900 feet. Following a prescribed surface fire in 1998, bracken fern established as dense understory vegetation. The terrain is gentle with moderately well-drained sandy soils.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Pinus ponderosa* has 50-60% canopy cover with an understory dominated by *Pteridium aquilinum* at 80% foliar cover. Grasses and forbs are present and contribute less than 5% cover. Where openings in the canopy of the mature ponderosa pine occur, grasses and sedges dominate mesic meadows.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Pinus ponderosa*
FERN	*Pteridium aquilinum*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Pinus ponderosa*
FERN	*Pteridium aquilinum*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This unique association was documented at the base of a sandstone outcrop, Pocket Mesa, in Pine Valley of Zion National Park. This association occurs infrequently in small mesic pockets of ponderosa pine woodlands.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 93 Park Special
Classification Confidence: 3 **Identifier:** CEGL002944
REFERENCES: None available.

PINUS PONDEROSA / QUERCUS GAMBELII WOODLAND
Ponderosa Pine / Gambel Oak Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This major woodland association is widespread and has been reported from foothills, mountains and plateaus from Colorado to Texas, west to Arizona and Nevada. Elevation ranges from 1830-2800 m (6000-9200 feet). Stands often occur along drainages, on lower and middle slopes and benches on all aspects. Soils are typically shallow and rocky ranging from sandy loams to clay loams. *Pinus ponderosa* dominates the sparse to moderately dense tree canopy sometimes with scattered *Pinus edulis* and *Juniperus* spp. and rarely *Pseudotsuga menziesii*. *Abies concolor* is not present. *Quercus gambelii* dominates both the subcanopy (tree form, if present) and the typically moderately dense tall-shrub layer consisting of dense clumps of oak. *Quercus gambelii* must have at least 5% cover, but there is frequently over 25%. At higher elevations, the *Quercus gambelii* are more tree-like and *Symphoricarpos oreophilus* will be present with significant cover in the short-shrub layer. At lower elevations, scattered *Artemisia tridentata ssp. vaseyana, Pinus edulis*, and *Juniperus osteosperma* are often present. Other common shrub species may include *Amelanchier* spp., *Mahonia repens*, and *Rosa woodsii*. The herbaceous layer is generally sparse and composed of mostly graminoids and scattered forbs.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at elevations between 5700 and 8000 feet on gently sloping terrain of mesas and plateaus. Soils are variable, ranging from sand to clay loam.

Global Environment: This woodland association is widespread and has been reported from foothills, mountains and plateaus from Colorado to Trans-Pecos Texas, west to Arizona and Nevada. Elevation ranges from 1830-2800 m (6000-9200 feet). Stands often occur along drainages, on lower and middle slopes and benches on all aspects. Slopes are typically gentle or moderate, but may also be steep (>45%). Soils are typically shallow and rocky ranging from sandy loams to clay loams. Parent materials are commonly sandstones, but fractured limestone, basalt, andesite, and alluvium are also reported. High litter cover (70-90%) about 5 cm deep is common in many stands. Rock outcrops (about 10%) and some bare soil are not uncommon. This conifer woodland transitions to *Quercus gambelii* shrubland in drier sites and at lower elevations. This community is the highest elevation *Pinus ponderosa* / oak woodland present in Trans-Pecos Texas. It typically grades downslope to *Pinus ponderosa / Quercus hypoleucoides* Woodland (CEGL000872).

VEGETATION DESCRIPTION

Zion National Park Vegetation: In this association, *Pinus ponderosa* has at least 20% cover and average height of 15-20 m. *Juniperus scopulorum* is occasionally present and in some cases has significant cover. *Quercus gambelii* is present as a tall and/or short shrub. Other shrubs commonly present with variable cover include *Arctostaphylos patula, Amelanchier utahensis, Purshia tridentata, Symphoricarpos oreophilus, Artemisia tridentata, Mahonia repens*, and *Artemisia nova*. Herbaceous cover is usually low, but has been observed with up to 40% cover. Common herbaceous species are *Poa fendleriana, Elymus elymoides, Heterotheca villosa, Carex rossii, Penstemon* spp., *Hymenopappus filifolius, Packera multilobata*, and *Arenaria fendleri*.

Global Vegetation: This broadly defined coniferous woodland is widespread and is characterized by a sparse to moderately dense, evergreen needle-leaved tree canopy dominated by *Pinus ponderosa*, sometimes with scattered *Pinus edulis, Juniperus scopulorum*, in southern stands and *Juniperus deppeana* and *Pinus strobiformis*. *Pseudotsuga menziesii* is accidental and *Abies concolor* is not present. *Quercus gambelii* dominates both the subcanopy (tree form, if present) and the typically moderately dense tall-shrub layer, which consists of dense clumps of oak. This community must have at least 5% cover of *Quercus gambelii*, but there is frequently over 25%. At higher elevations, the *Quercus gambelii* are more tree-like and *Symphoricarpos oreophilus* will be present with significant cover in a short-shrub layer. At lower elevations, scattered *Artemisia tridentata ssp. vaseyana, Pinus edulis*, and *Juniperus osteosperma* are often present. Other common shrub species may include *Arctostaphylos patula, Amelanchier* spp., *Cercocarpus montanus, Juniperus communis, Mahonia repens, Robinia neomexicana, Rosa woodsii*, and *Shepherdia rotundifolia*. The herbaceous layer is generally sparse (<10% cover), but may equal the shrub cover. It is composed of mostly graminoids such as *Bouteloua gracilis, Elymus elymoides, Festuca arizonica, Koeleria macrantha, Muhlenbergia longiligula, Muhlenbergia montana, Poa fendleriana, Schizachyrium scoparium*, and *Carex* spp., especially *Carex geyeri* and *Carex rossii*. Scattered forbs include *Artemisia ludoviciana,*

Balsamorhiza sagittata, Eriogonum spp., *Erigeron* spp., *Hymenoxys* spp., *Lithospermum multiflorum, Packera multilobata*, and *Wyethia amplexicaulis*.

Global Dynamics: *Pinus ponderosa* is a drought-resistant, shade-intolerant conifer that when mature has thick bark that allows it to withstand ground fires (Bradley et al. 1992). Natural fire frequency is estimated to be 3-20 years for this community (Young and Mauk 1982). *Quercus gambelii* is a fire-adapted species (Clary 1992). The root systems are well-developed and draw moisture from a large volume of soil allowing for rapid resprouting after fire. Both species are well-adapted to relatively frequent ground fires that prevent *Pseudotsuga menziesii* or *Abies concolor* from regenerating.

These woodlands grade into *Abies concolor / Quercus gambelii* Forest (CEGL000261) or *Pseudotsuga menziesii / Quercus gambelii* Forest (CEGL000452) as sites become cooler and wetter (DeVelice et al. 1986). Mosaics of *Pinus ponderosa* stands with grass- or oak-dominated understories occur in response to different substrates with *Quercus gambelii* dominating the rocky sites and grass understory woodland types (*Festuca* spp., *Muhlenbergia montana*) in areas with deeper soils (DeVelice et al. 1986, Peet 1981).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Pinus ponderosa*
TALL SHRUB	*Quercus gambelii*

Global

Stratum	Species
TREE CANOPY	*Pinus ponderosa*
TALL SHRUB	*Quercus gambelii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus scopulorum, Pinus ponderosa*
TALL SHRUB	*Arctostaphylos patula, Quercus gambelii*

Global

Stratum	Species
TREE CANOPY	*Pinus ponderosa*
TALL SHRUB	*Quercus gambelii*

GLOBAL SIMILAR ASSOCIATIONS:

- Abies concolor / Quercus gambelii Forest (CEGL000261)
- Pseudotsuga menziesii / Quercus gambelii Forest (CEGL000452)
- Pinus edulis - Juniperus spp. / Quercus gambelii Woodland (CEGL000791)
- Pinus monophylla - Juniperus osteosperma - Quercus gambelii / Artemisia tridentata Woodland (CEGL000837)
- Pinus monophylla - Quercus gambelii / Artemisia tridentata Woodland (CEGL000838)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: Stands of *Pinus ponderosa / Quercus gambelii* are widespread at high elevations in Zion National Park. This association was sampled on mesas and plateaus of Kolob Arch, Guardian Angels, Kolob Reservoir, and Temple of Sinawava quadrangles.

Global Range: This ponderosa pine woodland association is widespread in the southern Rocky Mountains and southwestern U.S. and occurs in foothills, mountains and plateaus from Colorado to Trans-Pecos Texas, west to Arizona and Nevada.

Nations: US
States/Provinces: AZ CO NM NV TX UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH10, RH48, RH54, RH62, RH89, 101, 203, 257, 258, 264, 372
Classification Confidence: 1 **Identifier:** CEGL000870

REFERENCES: Alexander et al. 1984a, Alexander et al. 1987, Bader 1932, Blackburn et al. 1969d, Blackburn et al. 1969e, Bourgeron and Engelking 1994, Bradley et al. 1992, Bunin 1975c, Clary 1992, DeVelice et al. 1986, Diamond 1993, Dixon 1935, Donart et al. 1978a, Driscoll et al. 1984, Fitzhugh et al. 1987, Hanks et al. 1983, Hanson and Ball 1928, Harmon 1980, Helm 1977, Hess and Wasser 1982, Johnston 1987, Johnston and Hendzel 1985, Larson and Moir 1987, Marr et al. 1973a, Muldavin et al. 1996, Peet 1975, Peet 1981, Roberts et al. 1992, Schmoll 1935, Somers et al. 1980, Steinhoff 1978, Terwilliger et al. 1979a, USFS 1983b, Wasser and Hess 1982, Wright et al. 1973, Youngblood and Mauk 1985

II.B.2.N.a. Cold-deciduous woodland

II.B.2.N.a.402. ELAEAGNUS ANGUSTIFOLIA SEMI-NATURAL WOODLAND ALLIANCE

Russian-olive Semi-natural Woodland Alliance

ELAEAGNUS ANGUSTIFOLIA SEMI-NATURAL WOODLAND
Russian-olive Semi-natural Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This widespread Russian-olive woodland type is found in the northern Great Plains, Utah, and probably throughout much of the western United States and adjacent Canada. It is a naturalized type that has been widely planted in hedgerows for windbreaks. It has since spread to a variety of native habitats, particularly more mesic ones, such as near streams and rivers. The vegetation is dominated by *Elaeagnus angustifolia*. In Badlands National Park, this type occupies a portion of shoreline along the White River, upstream of a highway bridge. In Ouray National Wildlife Refuge in Utah these woodlands are found in the floodplain along the Green River and in upland basins and drainages. Stands tend to be small and linear, with canopy cover varying from 40% to well over 80%. The vegetation is dominated by the tree *Elaeagnus angustifolia* with a variety of native and introduced species in the shrub and herbaceous layers. Associated species have not been thoroughly characterized, but can include the shrubs *Salix exigua, Tamarix ramosissima,* and *Amorpha fruticosa,* as well as a variety of herbaceous species, many of them introduced, such as*Pascopyrum smithii, Sporobolus airoides, Distichlis spicata*, *Hordeum jubatum, Lepidium latifolium, Descurainia sophia*, and *Bassia scoparia (= Kochia scoparia)*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association was not sampled at Zion NP, but occurred in the environs and was mapped.

Global Environment: This type is naturalized, probably spreading as a result of being widely planted in hedgerows for windbreaks. It has spread to a variety of native habitats, particularly more mesic ones, such as near streams and rivers. In Badlands National Park, this type occupies a portion of shoreline along the White River, upstream of a highway bridge (Von Loh et al. 1999). In Ouray National Wildlife Refuge in Utah these woodlands are found in the floodplain along the Green River and in upland basins and drainages (Von Loh et al. 2002). Stands tend to be small and linear. Adjacent vegetation includes other riparian shrublands and wetlands dominated by *Salix exigua* or *Schoenoplectus* spp. Upland vegetation is variable.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association was not sampled at Zion NP, but occurred in the environs and was mapped.

Global Vegetation: The vegetation is dominated by the tree *Elaeagnus angustifolia* with a variety of native and introduced species in the shrub and herbaceous layers. Associated species have not been characterized. In a stand in Badlands National Park of South Dakota, *Elaeagnus angustifolia* is dominant. Canopy closure approaches 40-50%, about equal to the tall-shrub cover provided by *Salix exigua*. *Amorpha fruticosa* and *Pascopyrum smithii* make up the short-shrub and herbaceous cover, which are less than 10%. At Ouray National Wildlife Refuge in Utah, tree canopies were denser to (80% cover) and had remnant *Populus fremontii* trees (to 10% cover). Other than a few native grasses (*Sporobolus airoides, Distichlis spicata*, and *Hordeum jubatum*) and *Atriplex patula* in the herbaceous layer, the understory was dominated by introduced species, both in the moderately dense to dense tall-shrub layer (*Tamarix ramosissima*) and in the herbaceous layer (*Lepidium latifolium, Descurainia sophia*, and *Bassia scoparia* (= *Kochia scoparia*) (Von Loh et al. 2002).

Global Dynamics: *Elaeagnus angustifolia* has been planted widely across the western U.S. in windbreaks and as an ornamental. This tree species has bird-dispersed seeds and has invaded riparian woodlands extensively, replacing the native tree species, especially where flood control efforts limit regeneration of native trees such as *Populus deltoides* and *Populus fremontii*.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Elaeagnus angustifolia*
TALL SHRUB	*Tamarix ramosissima*
GRAMINOID	*Bromus rigidus, Poa pratensis*

Global

Stratum	Species
TREE CANOPY	*Elaeagnus angustifolia*
TALL SHRUB	*Tamarix ramosissima, Salix exigua*
SHORT SHRUB	*Amorpha fruticosa*
GRAMINOID	*Pascopyrum smithii, Bromus inermis, Poa pratensis*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Elaeagnus angustifolia*

Global

Stratum	Species
TREE CANOPY	*Elaeagnus angustifolia*

OTHER NOTEWORTHY SPECIES

Global

Stratum	Species
GRAMINOID	*Bromus tectorum*

GLOBAL SIMILAR ASSOCIATIONS:

- Populus fremontii / Salix exigua Forest (CEGL000666)
- Populus deltoides - (Salix amygdaloides) / Salix (exigua, interior) Woodland (CEGL000659)
- Populus deltoides ssp. wislizeni / Baccharis sarothroides Forest (CEGL000663)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: GW.

Global Comments: *Populus deltoides*- and *Populus fremontii*-dominated associations may have significant cover of *Elaeagnus angustifolia* in the tree canopy, but are generally considered native woodlands until *Elaeagnus angustifolia* comprises over 80-90% of the tree cover. Some stands have a nearly closed tree canopy (80% cover), or may have significant gaps in the tree canopy.

ELEMENT DISTRIBUTION

Zion National Park Range: This was not sampled at Zion NP, but occurred in the environs and was mapped. It likely occurs in lowlands along stream channels and in disturbed riparian forest in canyons.

Global Range: This widespread Russian-olive woodland type is reported from the northern Great Plains, Utah, and probably occurs throughout much of the western United States and adjacent Canada along rivers and streams where it replaces the native *Populus* spp.- and *Acer negundo*-dominated forests and woodlands.

Nations: US
States/Provinces: ND SD UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: None
Classification Confidence: 3 **Identifier:** CEGL005269
References: Great Plains Flora Association 1986, Von Loh et al. 1999, Von Loh et al. 2002

II.B.2.N.b. Temporarily flooded cold-deciduous woodland

II.B.2.N.b.10. ACER NEGUNDO TEMPORARILY FLOODED WOODLAND ALLIANCE

Box-elder Temporarily Flooded Woodland Alliance

ACER NEGUNDO / BRICKELLIA GRANDIFLORA WOODLAND [PROVISIONAL]

Box-elder / Tasselflower Brickelbush Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: This association occurs on a narrow valley floor at an elevation of 5500 feet on sandy soils.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: In this association, *Acer negundo* has a canopy cover of 20-30% and heights ranging from 5-15 m. Shrubs are scarce or absent. The herbaceous layer has significant cover of *Brickellia grandiflora*. Other herbaceous species present are variable and contribute minimal cover.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Acer negundo*
FORB	*Brickellia grandiflora*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Acer negundo*
FORB	*Brickellia grandiflora*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs along the South Fork of Taylor Creek in Kolob Canyons of the park.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH75, RH76
Classification Confidence: **Identifier:** CEGL002692
REFERENCES: None available.

ACER NEGUNDO / DISTURBED UNDERSTORY WOODLAND [PROVISIONAL]
Box-elder / Disturbed Understory Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: Mature stands of *Acer negundo* occupy flat to gentle sloping stream terraces above the stream channel at elevations of 5500-5700 feet. Soils are sandy and well-drained.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association occurs frequently on stream terraces or cut banks well above the current stream channel and at the base of colluvial slopes in Lee Valley and Hop Valley. *Acer negundo* is mature, many-stemmed and sprawling. A few trees provide 10-30% cover and average 10 m in height. Shrubs present include *Prunus virginiana* and *Quercus gambelii*. The understory is variable and dominated by the exotic grass *Bromus tectorum*. Other grasses that may be present include *Sporobolus cryptandrus, Poa pratensis*, and *Poa fendleriana*. Forbs may include *Senecio spartioides, Verbascum thapsus, Phacelia heterophylla, Solidago velutina, Sisymbrium altissimum*, and *Tradescantia occidentalis*.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Acer negundo*
GRAMINOID	*Bromus tectorum*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Acer negundo*
GRAMINOID	*Bromus tectorum*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on stream terraces along Timber Creek and Hop Valley.

Global Range: This association has currently only been described from Zion NP in southwestern Utah. However, it is likely to be widely distributed across the Colorado Plateau region, and elsewhere in the southwestern U.S.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 26, 77, 81
Classification Confidence: **Identifier:** CEGL002693
REFERENCES: None available.

II.B.2.N.b.400. FRAXINUS ANOMALA TEMPORARILY FLOODED WOODLAND ALLIANCE

Single-leaf Ash Temporarily Flooded Woodland Alliance

FRAXINUS ANOMALA WOODLAND

Single-leaf Ash Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This locally occurring association is found in deep canyons and mountains on the Colorado Plateau in southwestern Utah and western Colorado. This vegetation is restricted to mesic sites such as near seeps, springs and ephemeral stream channels, or on lower colluvial slopes where additional soil moisture is available. Substrates often are derived from colluvium and have large amounts of gravel and cobbles. Parent material is typically sandstone. The vegetation is characterized by a moderately dense (30-50%) cold-deciduous tall-shrub canopy that is dominated by *Fraxinus anomala* with *Quercus gambelii* codominating the Colorado stand. Associated shrubs include *Amelanchier alnifolia, Ericameria nauseosa, Holodiscus dumosa, Rhus trilobata*, and *Symphoricarpos rotundifolius.* Herbaceous species are variable and contribute minimal cover.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at 4300 feet in a moderately steep, east-facing drainage. Soil texture is loamy sand.

Global Environment: This woodland association is found in deep canyons and mountains on the Colorado Plateau in southwestern Utah and western Colorado. Elevation ranges from 1430-2000 m (4300-5825 feet). Climate is semi-arid; however, this vegetation is restricted to mesic sites such as near seeps, springs and ephemeral stream channels, or on lower colluvial slopes where additional soil moisture is available. Substrates often are derived from colluvium and have large amounts of gravel and cobbles. Parent material is typically sandstone.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association, though only documented once in the park, likely occurs in small pockets where moisture collects at the base of boulders in ravines and colluvial slopes. *Fraxinus anomala* is dominant with 30% cover and heights of approximately 5 m. Shrubs that are likely to occur are *Amelanchier alnifolia, Rhus trilobata*, and *Ericameria nauseosa*. Herbaceous species are variable and contribute minimal cover.

Global Vegetation: This association is characterized by a moderately dense (30-50%) cold-deciduous tall-shrub canopy that is dominated by *Fraxinus anomala* with *Quercus gambelii* codominating the Colorado stand. Associated shrubs include *Amelanchier alnifolia, Ericameria nauseosa, Holodiscus dumosa, Rhus trilobata*, *Symphoricarpos rotundifolius,* and the vine *Vitis arizonica*. Herbaceous species are variable and contribute minimal cover. Common species include *Achnatherum hymenoides,* Asteraceae spp., *Eriogonum* spp., and *Poa fendleriana*.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Fraxinus anomala*

Global

Stratum	Species
TALL SHRUB	*Fraxinus anomala, Quercus gambelii, Amelanchier alnifolia*
SHORT SHRUB	*Ericameria nauseosa, Rhus trilobata*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Amelanchier alnifolia, Fraxinus anomala*
SHORT SHRUB	*Ericameria nauseosa, Rhus trilobata*

Global

Stratum	Species
TALL SHRUB	*Fraxinus anomala*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: GUQ.

Global Comments: This association is known from only 2 stands, one on the Roan Plateau in western Colorado and one in Zion National Park. More survey and classification work are needed to fully describe this association rangewide. *Fraxinus anomala* is present in many montane shrubland and woodland communities on the Colorado Plateau, but is only a dominant species in this association.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs in drainage that empties into Shune's Creek at the western border of the park.

Global Range: This woodland association occurs in canyons and mountains on the Colorado Plateau in southwestern Utah and western Colorado, and may occur in similar habitats in Arizona and New Mexico.

Nations: US
States/Provinces: AZ? CO NM? UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 523. This association was never seen again during Accuracy Assessments.
Classification Confidence: 3 **Identifier:** CEGL002752
REFERENCES: Kittel et al. 1999b, Welsh et al. 1987

II.B.2.N.b.12. POPULUS FREMONTII TEMPORARILY FLOODED WOODLAND ALLIANCE

Fremont Cottonwood Temporarily Flooded Woodland Alliance

POPULUS FREMONTII - FRAXINUS VELUTINA WOODLAND

Fremont Cottonwood - Velvet Ash Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This is a lowland forested riparian association known from central and southeastern Arizona, southwestern New Mexico and southwestern Utah. Elevations range from 1200-1550 m . Sites are typically rocky or sandy banks of moderate-gradient streams (1.5%) that are frequently flooded (two-year recurrence interval). Soils have been reported as coarse-loamy over fragmental Typic Torrifluvents, and as cobbly riverwash, reflecting the coarse substrates of sites. *Populus fremontii* and *Fraxinus velutina* codominate young, moderate to dense canopies (>50% cover). *Acer negundo, Salix gooddingii, Juglans major, Alnus oblongifolia*, and *Celtis laevigata var. reticulata* are occasional canopy or subcanopy associates. Undergrowth is moderately diverse, but cover is low. In the shrub layer there are usually scattered individuals of *Baccharis salicifolia* and *Amorpha fruticosa*. The herbaceous layer has sparse to moderate cover. Common associates may include *Juncus saximontanus, Sphenopholis obtusata, Sporobolus cryptandrus, Muhlenbergia wrightii*, and *Datura wrightii*. Disturbed stands often have high cover of the introduced *Bromus diandrus, Bromus tectorum*, or some other exotics.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: This association occurs on sandy alluvial terraces and streambanks. Slopes are gentle to moderate at elevations around 4000 feet. On the edge of its range, in Pine Creek Wash, it occurs at a higher elevation in the cool drainage or ravine.

Global Environment: This is a lowland forested riparian association known from central and southeastern Arizona, southwestern New Mexico and southwestern Utah. Elevations range from 1200-1550 m . Sites are typically rocky or sandy banks of moderate-gradient streams (1.5%) that are frequently flooded (two-year recurrence interval). However, stands are also reported from higher elevations in cool drainages or ravines. Soils have been reported as coarse-loamy over fragmental Typic Torrifluvents, and as cobbly riverwash, reflecting the coarse substrates of sites.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association is widespread along the Virgin River in Zion Canyon, which is heavily disturbed from human activity. Herbaceous cover in the river corridor is strongly dominated by exotic species *Bromus diandrus* and *Bromus tectorum*. Native species in the understory have minimal cover and are inconsistent and, thus, cannot be described as regular inhabitants here. *Populus fremontii* is present in the floodplain and widely spaced on the riverbank. Mature trees emerge from the canopy at more than 20 m in height and contribute 10-30% foliar cover. Young cottonwood may be present in the subcanopy layer. *Acer negundo* contributes 1-20% cover in the subcanopy and usually co-exists with abundant *Fraxinus velutina*. *Quercus gambelii* in tree form may also contribute significant cover to the subcanopy. Total canopy cover is 30-60%. In some cases, it may be higher, as in Pine Creek Wash, where canopy cover is nearly 100%, and a lush, comparatively undisturbed understory exists. At this middle elevation, cool drainage, *Populus angustifolia* is a major contributor to the canopy cover.

Global Vegetation: This riparian association is characterized by an open to moderately dense canopy (20-60% cover) that is codominated by large *Populus fremontii* and *Fraxinus velutina* trees. *Acer negundo, Salix gooddingii, Juglans major, Alnus oblongifolia, Celtis laevigata var. reticulata*, and *Populus angustifolia* (at higher elevations) are occasional canopy associates, but may be more common in the subcanopy (if present). Undergrowth is moderately diverse, but cover is low. In the shrub layer there are usually scattered individuals of *Amorpha fruticosa, Baccharis salicifolia*, and several other shrubs including *Baccharis emoryi, Brickellia californica*, and *Ericameria nauseosa*. The herbaceous layer has sparse to moderate cover. Common associates may include *Juncus saximontanus, Sphenopholis obtusata, Sporobolus cryptandrus, Muhlenbergia wrightii*, and *Datura wrightii*. Disturbed stands often have high cover of the introduced *Bromus diandrus, Bromus tectorum*, or some other exotics.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Acer negundo, Fraxinus velutina, Populus fremontii, Quercus gambelii*
GRAMINOID	*Bromus diandrus, Bromus tectorum*

Global

Stratum	Species
TREE CANOPY	*Acer negundo, Fraxinus velutina, Populus fremontii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Acer negundo, Fraxinus velutina, Populus fremontii*

Global

Stratum	Species
TREE CANOPY	*Fraxinus velutina, Populus fremontii*

OTHER NOTEWORTHY SPECIES

Global

Stratum	Species
GRAMINOID	*Bromus diandrus, Bromus tectorum*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G2G3.

Global Comments: Szaro (1989) describes a *Populus fremontii - Fraxinus pennsylvanica* Community Type that is synonymous. Similarly, Boles and Dick-Peddie (1983) report *Populus fremontii - Fraxinus pennsylvanica* type in the Mimbres watershed that is possibly also synonymous.

ELEMENT DISTRIBUTION

Zion National Park Range: Stands of *Populus fremontii - Fraxinus velutina* are common along the Virgin River from the top of Zion Canyon to the Visitors Center. Small stands of similar species composition occur on permanent streams in the park, specifically Pine Creek Wash, a tributary of the Left Fork of the North River.

Global Range: This association occurs in lowlands of southwestern New Mexico, southern Arizona, southwestern Utah, and may occur in western Texas.

Nations: US
States/Provinces: AZ NM TX? UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH15, RH 21, RH40, 2, 145
Classification Confidence: 2 **Identifier:** CEGL000942
REFERENCES: Boles and Dick-Peddie 1983, Bourgeron and Engelking 1994, Driscoll et al. 1984, Muldavin et al. 2000a, Szaro 1989

POPULUS FREMONTII / BACCHARIS EMORYI WOODLAND [PROVISIONAL]

Fremont Cottonwood / Emory Seepwillow Woodland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: This association occurs on flat, sandy streambanks and terraces at elevations around 4000 feet. River or stream water is present year round and the floodplain is broad.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This riparian association is heavily impacted by human disturbance. Stands of *Populus fremontii* along the Virgin River are mature with no apparent regeneration occurring. Cottonwoods are 10-15 m tall and average 30% foliar cover. *Baccharis emoryi* grows in close proximity to the river, its cover ranging from 5-80%. *Salix* spp. often exist with the Emory seepwillow, but with minimal cover. Shrubs that occur farther up the stream's bank are *Ericameria nauseosa* and *Artemisia filifolia*. The herbaceous layer is sparse and dominated by exotics in Zion Canyon and farther downstream along the Virgin River. Stands that occur in the moderately disturbed Right Fork of North Creek have herbaceous cover of nearly 50%, though exotic herbaceous species are still prevalent.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Populus fremontii*
SHORT SHRUB	*Baccharis emoryi, Ericameria nauseosa*
GRAMINOID	*Bromus diandrus, Bromus tectorum, Muhlenbergia asperifolia*
FORB	*Melilotus officinalis*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Populus fremontii*
SHORT SHRUB	*Baccharis emoryi*

Global

Stratum	Species
Information not available.	

OTHER NOTEWORTHY SPECIES

Zion National Park

Salix spp. are also dominant and diagnostic.

Global

Stratum	Species

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on streambanks in the Virgin River corridor and Right Fork of North Creek.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH22, RH23, RH46, RH84, 17, 142
Classification Confidence: **Identifier:** CEGL002946
REFERENCES: None available.

III. SHRUBLAND

III.A.2.N.c. Sclerophyllous temperate broad-leaved evergreen shrubland

III.A.2.N.c.35. ARCTOSTAPHYLOS PATULA SHRUBLAND ALLIANCE

Greenleaf Manzanita Shrubland Alliance

ARCTOSTAPHYLOS PATULA - ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUBLAND

Greenleaf Manzanita - Mountain Big Sagebrush Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at 6400 feet on gentle east-facing slopes of a small isolated mesa. Soil texture is loamy sand.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This shrubland was only documented at one site in Zion National Park. It is likely to occur in equally remote areas in the near vicinity. *Arctostaphylos patula* dominates this shrubland as it does on mesa tops throughout the park. In this association, however, *Artemisia tridentata ssp. vaseyana* is codominant. Total shrub cover is over 60%. *Quercus gambelii* is a likely component of this shrubland. Other shrubs that may occur are *Tetradymia canescens, Ericameria nauseosa, Yucca* spp., and *Opuntia* spp. The herbaceous layer is very sparse, but will commonly include *Comandra umbellata, Eriogonum umbellatum, Poa fendleriana*, and *Bouteloua gracilis*.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Arctostaphylos patula, Artemisia tridentata ssp vaseyana, Quercus gambelii*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Arctostaphylos patula, Artemisia tridentata ssp vaseyana, Quercus gambelii*
FORB	*Comandra umbellata, Eriogonum umbellatum*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:

- Tetradymia canescens - Ephedra viridis Shrubland (CEGL002973)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was found on an unnamed mesa south of Mystery Canyon in the Temple of Sinawava quadrangle.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 314, 315. This association could be confused with *Tetradymia canescens* Mixed Shrubland.
Classification Confidence: 3 **Identifier:** CEGL002694
REFERENCES: None available.

ARCTOSTAPHYLOS PATULA - QUERCUS GAMBELII - (AMELANCHIER UTAHENSIS) SHRUBLAND
Greenleaf Manzanita - Gambel Oak - (Utah Serviceberry) Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at elevations between 6000 and 8000 feet on gentle to moderately steep slopes of mesas or high-elevation plateaus. Slope aspects are variable. Soils texture is mostly sandy loam.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Stands of this association are common and widespread at the high elevations of Zion National Park. *Arctostaphylos patula* and *Quercus gambelii* codominate, each with cover ranging from 5-50%. Other shrubs that occur with less than 10% cover are *Cercocarpus montanus, Amelanchier utahensis, Symphoricarpos oreophilus, Quercus turbinella*, and *Ericameria nauseosa*. Total shrub cover is variable, 20-80%. Graminoid species that commonly occur are *Poa fendleriana, Bouteloua gracilis*, and *Sporobolus cryptandrus*. Single trees of *Juniperus osteosperma* and *Pinus edulis* have been noted in some stands.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Arctostaphylos patula, Quercus gambelii*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Amelanchier utahensis, Arctostaphylos patula, Cercocarpus montanus, Quercus gambelii, Symphoricarpos oreophilus*
GRAMINOID	*Bouteloua gracilis, Poa fendleriana, Sporobolus cryptandrus*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs frequently on high mesas throughout the park, specifically on Great White Throne, Burnt Top Mountain, Timber Top Mountain, mesa near Wynopits, Beehives, Altar of Sacrifice, and Horse Mountain Plateau.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 12, 95, 267, 270, 274, 301, 351, 381
Classification Confidence: 2 **Identifier:** CEGL002695
REFERENCES: None available.

ARCTOSTAPHYLOS PATULA SHRUBLAND
Greenleaf Manzanita Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on gentle to moderate slopes of mesa tops and plateaus at elevations of 5700-7800 feet. Slopes are of all aspects. Soil texture is sand to sandy loam. Litter ground cover is limited to underneath the shrubs in each stand.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This shrubland association is dominated by *Arctostaphylos patula* with 5-80% foliar cover. *Quercus gambelii, Amelanchier utahensis, Yucca elata var. utahensis, Artemisia tridentata, Purshia tridentata, Ericameria nauseosa*, and *Tetradymia canescens* are shrubs that may be present, each with less than 5% cover, and combined with less than 10% cover. Lone *Pinus ponderosa* trees are occasionally present with cover less than 10%. Herbaceous species are variable in composition and contribute minimal cover. Common graminoids present in the understory of the sampled associations are *Poa fendleriana, Sporobolus cryptandrus, Elymus elymoides, Hesperostipa comata, Achnatherum hymenoides*, and *Carex rossii*. Common forbs sampled are *Arenaria fendleri, Arenaria macradenia, Comandra umbellata, Tragopogon dubius, Phlox austromontana, Hymenopappus filifolius, Packera multilobata, Vicia americana, Frasera speciosa, Machaeranthera canescens, Heterotheca villosa, Tradescantia occidentalis, Penstemon caespitosus*, and other *Penstemon* spp.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Arctostaphylos patula*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Arctostaphylos patula*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: Stands of *Arctostaphylos patula* shrubs are widespread across the high-elevation mesas. Associations were documented throughout the northern region of the park.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH16, RH49, RH90, RH11, RH30, 32, 71, 125, 210, 262, 362, 8, 13, 35, 356, 509, 252, 251, 85, 204, 364
Classification Confidence: **Identifier:** CEGL002696
REFERENCES: None available.

III.A.2.N.c.36. ARCTOSTAPHYLOS PUNGENS SHRUBLAND ALLIANCE

Mexican Manzanita Shrubland Alliance

ARCTOSTAPHYLOS PUNGENS SHRUBLAND

Mexican Manzanita Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This chaparral association has been described from the Virgin Mountains in southern Nevada, Markagunt Plateau in southwestern Utah, the Mogollon Rim in Arizona south to the Animas Mountains in southwestern New Mexico. Sites include dry, gentle to moderate slopes of mountains and plateaus. Substrates are variable and range from rocky, coarse-textured soil to clay loam. The vegetation is characterized by a typically dense, tall-shrub layer dominated by *Arctostaphylos pungens* (50-70% cover) with sparse short-shrub or herbaceous layers. Associated shrubs vary geographically with *Arctostaphylos patula, Amelanchier utahensis, Ceanothus* spp., *Cercocarpus ledifolius, Ephedra viridis, Garrya flavescens, Mahonia fremontii, Quercus gambelii, Quercus turbinella*, or *Robinia neomexicana* present in the northern extant and *Arctostaphylos pringlei, Ceanothus* spp., *Garrya wrightii, Nolina microcarpa, Quercus hypoleucoides, Q. turbinella*, or scattered *Q. rugosa* or *Pinus discolor* trees present in the southern extent. The herbaceous layer, if present, consists of sparse cover of grasses or forbs.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: The site where this association occurs is a moderately steep slope at 6800 feet with southwest aspect. Soil texture is clay loam.

Global Environment: This chaparral association has been described from the Virgin Mountains in southern Nevada, Markagunt Plateau in southwestern Utah, the Mogollon Rim in Arizona south to the Animas Mountains in southwestern New Mexico. Elevation ranges from 980-2470 m (3200-8100 feet). Sites include dry gentle to moderate slopes of mountains and plateaus. Substrates range from coarse textured, gravelly soils with rocks to clay loam. Parent material includes rhyolite, granite, quartzite and sandstone.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association is uncommon in the park. Here, at the northern extent of its range, *Arctostaphylos pungens* is usually an insignificant component of montane shrub communities. At this site, it dominates with 10% cover. Other shrub species present with less cover include *A. patula, Amelanchier utahensis, Quercus gambelii*, and *Ceanothus fendleri*. Total shrub cover is 20%. Shrub interspaces are primarily exposed ashy clay soils and small gravelly rock. *Penstemon caespitosus* is the prominent herbaceous species at this site.

Global Vegetation: This association is characterized by a dense tall-shrub layer dominated by *Arctostaphylos pungens* with sparse short-shrub and herbaceous layers. Stands in Nevada include associated species such as *Cercocarpus ledifolius, Robinia neomexicana, Garrya flavescens, Ephedra viridis, Quercus turbinella, Amelanchier utahensis, Mahonia fremontii*, and *Ceanothus greggii*. In Utah the shrub layer was open (about 20% cover) with 10% cover of *Arctostaphylos pungens*. *Arctostaphylos patula, Amelanchier utahensis, Quercus gambelii*, and *Ceanothus fendleri* were present in small amounts. *Penstemon caespitosus* and other scattered forbs were present. In Arizona, stands averaged 86% shrub canopy cover and were dominated by *Arctostaphylos pungens* (55%), with 12% cover *Ceanothus* spp, 9% cover *Arctostaphylos pringlei*, and scattered *Quercus turbinella* and other shrub species. In New Mexico stands were less diverse. *Arctostaphylos pungens* canopy cover was 70% with less than 5% tree cover of *Quercus hypoleucoides, Quercus rugosa* and *Pinus discolor*. Other species were sparse and included less than 5% cover of *Nolina microcarpa* and *Garrya wrightii*. Introduced annual species are common in some stands.

Global Dynamics: *Arctostaphylos pungens* is a fire-adapted species that reproduces prolifically from heat-scarified seeds after fires (Carmichael et al. 1978). Armstrong (1969) considers these shrublands a fire disclimax. Prior to a fire, the *Arctostaphylos pungens* shrubland he described was a *Pinus monophylla / Juniperus osteosperma* woodland because of the numerous stumps present. He believed the lack of tree regeneration was caused by the low rainfall and re-occurring fires. Bourgeron et al. (1993b) suggest that this a seral phase of the *Pinus discolor / Quercus hypoleucoides* woodland. Most of the woody species associated with this association are fire-adapted and often replace burned-over conifer woodlands (Carmichael et al. 1978). This all would indicate that fire promotes/maintains this community.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Arctostaphylos pungens*

Global

Stratum	Species
TREE CANOPY	*Amelanchier utahensis*
TALL SHRUB	*Arctostaphylos pungens*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Amelanchier utahensis, Arctostaphylos patula, Arctostaphylos pungens, Quercus gambelii*
FORB	*Penstemon caespitosus*

Global

Stratum	Species
TALL SHRUB	*Arctostaphylos pungens*

GLOBAL SIMILAR ASSOCIATIONS:

- Quercus turbinella - Garrya flavescens - Arctostaphylos pungens Shrubland (CEGL000977)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G4.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled at Corral Hollow on the Horse Pasture Plateau of Zion National Park. It has also been observed in small stands in the Kolob Canyons region of the park.

Global Range: This association occurs from the Virgin Mountains in extreme southeastern Nevada and adjacent Utah to the Gray Ranch in extreme southwestern New Mexico. It likely occurs in adjacent Mexico.

Nations: US
States/Provinces: NM NV UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 98 (This site was burned in 1996.)
Classification Confidence: 2 **Identifier:** CEGL000958
REFERENCES: Armstrong 1969, Bourgeron and Engelking 1994, Bourgeron et al. 1993b, Carmichael et al. 1978, Driscoll et al. 1984

III.A.2.N.c.40. QUERCUS TURBINELLA SHRUBLAND ALLIANCE

Turbinella Live Oak Shrubland Alliance

QUERCUS TURBINELLA - (AMELANCHIER UTAHENSIS) COLLUVIAL SHRUBLAND

Turbinella Live Oak - (Utah Serviceberry) Colluvial Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: Elevation for this association ranges between 4500 and 6500 feet on moderate to steep colluvial slopes with sandy-textured soils.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association commonly occupies the steep colluvial slopes below towering sandstone walls in the park. *Quercus turbinella* is typically dominant with 10-70% cover. *Quercus turbinella* was absent in one plot sampled, but other characteristics were similar to this association's description. The mixture of other shrubs represented in the sampled sites includes *Amelanchier utahensis, Arctostaphylos pungens, Arctostaphylos patula, Shepherdia rotundifolia, Fraxinus anomala, Rhus trilobata*, and *Quercus gambelii*, which may be present to abundant. Common subshrubs include *Opuntia* spp., *Yucca* spp., and *Gutierrezia sarothrae*. Pinyon and juniper trees may be present, but have insignificant cover. Common herbaceous species are inconsistent in composition and have minimal cover.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Quercus turbinella*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Amelanchier utahensis, Arctostaphylos patula, Arctostaphylos pungens, Quercus turbinella*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs throughout Zion National Park on colluvial slopes below sandstone walls.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH70, 1, 106, 138, 144, 146, 513, 527, 18, 82
Classification Confidence: 3 **Identifier:** CEGL002950
REFERENCES: None available.

III.A.2.N.h. Seasonally flooded temperate broad-leaved evergreen shrubland

III.A.2.N.h.2. PLUCHEA SERICEA SEASONALLY FLOODED SHRUBLAND ALLIANCE

Arrow-weed Seasonally Flooded Shrubland Alliance

PLUCHEA SERICEA SEASONALLY FLOODED SHRUBLAND [PLACEHOLDER]

Arrow-weed Seasonally Flooded Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This evergreen shrubland is found in wetlands from southern Californiato the Sonoran Desert, and extends north into the Colorado Plateau in southwestern Utah. Elevation ranges from sea level to 1220 m (4000 feet). Stands occur in canyon bottoms, irrigation ditches, streamsides, floodplains, and along the margins of springs. Sites are flat to gently sloping and are permanently or seasonally flooded with a high water table. Water chemistry may be fresh or saline/alkaline. Substrates are generally alluvial and vary from well-drained to poorly drained and coarse-textured to fine-textured soil. The vegetation is characterized by a moderately dense to dense short- to tall-shrub layer (1-5 m tall) that is dominated by *Pluchea sericea*, often forming pure stands. Stands generally form small patches within other wetland and riparian vegetation. Other species are present with low cover and vary regionally. Shrub associates may include *Allenrolfea occidentalis, Atriplex* spp., *Baccharis* spp., *Prosopis* spp., *Salix exigua, Suaeda moquinii*, and introduced *Tamarix* spp. The typically sparse herbaceous layer, if present, is typically composed of *Distichlis spicata, Scirpus americanus, Sporobolus airoides*, or *Typha angustifolia*. The presence of weedy species is common in disturbed stands.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: Stands of *Pluchea sericea* occur below 4000 feet on river floodplains with clay loam to sandy soils.

Global Environment: This evergreen shrubland is found in wetlands in southern California, the Mojave, Colorado and Sonoran deserts, and extends north into the Colorado Plateau in southwestern Utah. Elevation ranges from sea level to 1220 m (4000 feet). Stands occur in canyon bottoms, irrigation ditches, streamsides, floodplains, and along the margins of springs. Sites are flat to gently sloping and are permanently or seasonally flooded with a high water table. Water chemistry may be fresh or saline/alkaline. Substrates are generally alluvial and vary from well-drained to poorly drained and coarse-textured to fine-textured soil.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Pluchea sericea* dominates this association with 40% cover and heights of 1 m. Herbaceous cover is minimal, less than 10%, and usually composed of exotic species due to its frequent exposure to human and/or livestock disturbance.

Global Vegetation: This plant association is characterized by a moderately dense to dense short- to tall-shrub layer (1-5 m tall) that is dominated by *Pluchea sericea*, often forming pure stands. Stands generally form small patches within other wetland and riparian vegetation. Other species are present with low cover and vary regionally. Shrub associates may include *Allenrolfea occidentalis, Atriplex canescens, Atriplex torreyi, Baccharis emoryi, Baccharis sergiloides, Prosopis glandulosa, Prosopis pubescens, Salix exigua, Suaeda moquinii*, and introduced *Tamarix* spp. The typically sparse herbaceous layer, if present, is typically composed of *Distichlis spicata, Scirpus americanus, Sporobolus airoides*, or *Typha angustifolia*. Weedy species such as *Erodium cicutarium, Lactuca* spp., *Melilotus officinalis* are common in disturbed stands.

Global Dynamics: This riparian association grows in seasonally flooded, freshwater and brackish habitats with permanently saturated ground. Exotic tamarisk species have invaded many occurrences of this alliance.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Pluchea sericea*
SHORT SHRUB	*Gutierrezia sarothrae*
GRAMINOID	*Sporobolus cryptandrus*
FORB	*Melilotus officinalis*

Global

Stratum	Species
TALL SHRUB	*Pluchea sericea*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Pluchea sericea*
GRAMINOID	*Sporobolus cryptandrus*

Global

Stratum	Species
TALL SHRUB	*Pluchea sericea*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G3?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs near the confluence of the East Fork and North Fork of the Virgin River. Additional stands are found along the Virgin River at the southern boundary of the park. Another stand within the park occurs in Coal Pits Wash near the southern boundary.

Global Range: This wetland association occurs in wetlands in southern California, the Mojave, Colorado and Sonoran deserts, and extends north into the Colorado Plateau in southwestern Utah.

Nations: US
States/Provinces: CA UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 522
Classification Confidence: 2 **Identifier:** CEGL003080
REFERENCES: Barbour and Major 1977, Beatley 1976, Holland 1986b, Sawyer and Keeler-Wolf 1995

III.A.4.N.a. Lowland microphyllous evergreen shrubland

III.A.4.N.a.4. ARTEMISIA FILIFOLIA SHRUBLAND ALLIANCE

Sand Sagebrush Shrubland Alliance

ARTEMISIA FILIFOLIA COLORADO PLATEAU SHRUBLAND

Sand Sagebrush Colorado Plateau Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on floodplain terraces and alluvial fans with extremely sandy soils. Slopes are flat to moderately steep with southeastern to southwestern aspects.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association is dominated by *Artemisia filifolia* with foliar cover ranging from 20-50%. *Psorothamnus fremontii* is present at some sites. *Sporobolus cryptandrus* and *Pleuraphis jamesii* occur in shrub interspaces averaging 10% cover. Other minimal herbaceous cover includes species adapted to dry sandy sites and often the invasive exotic *Bromus tectorum*.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Artemisia filifolia*
GRAMINOID	*Bromus tectorum, Sporobolus cryptandrus*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Artemisia filifolia*
GRAMINOID	*Sporobolus cryptandrus*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs only in the southernmost region of the park in the North and East Fork of the Virgin River corridors.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH41, 150, 508, 512, 518
Classification Confidence: 2 **Identifier:** CEGL002697
REFERENCES: None available.

III.A.4.N.a.17. ARTEMISIA TRIDENTATA SHRUBLAND ALLIANCE

Big Sagebrush Shrubland Alliance

ARTEMISIA TRIDENTATA - (ERICAMERIA NAUSEOSA) / BROMUS TECTORUM SEMI-NATURAL SHRUBLAND

Big Sagebrush - (Rubber Rabbitbrush) / Cheatgrass Semi-natural Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on alluvial flats and benches with sandy soils. It also occurs in clay soils found in association with Crater Hill and Coal Pits Wash. Elevation ranges between 3700 and 6400 feet.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Composition of this association is somewhat variable. *Artemisia tridentata* is always present with cover ranging from 10-50% and averaging 1 m in height. *Ericameria nauseosa* is not always present, but is highly likely to be present at least in the vicinity. Its cover ranges from 0-20% in sampled stands. Other shrubs that may occur with minimal cover are *Chrysothamnus viscidiflorus, Tetradymia canescens, Opuntia* spp., and *Gutierrezia* spp. In the herbaceous layer, *Bromus tectorum* cover ranges from 1-15%. Other graminoids found in the sampled stands are *Sporobolus cryptandrus, Pleuraphis jamesii, Elymus elymoides, Poa fendleriana, Pascopyrum smithii*, and *Bromus diandrus*. Forb species are inconsistent in composition among the sites. Forbs that most commonly occur are *Senecio spartioides, Heterotheca villosa*, and *Tradescantia occidentalis*. Total herbaceous cover ranges from 1-30%.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Artemisia tridentata*
GRAMINOID	*Bromus tectorum*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Artemisia tridentata, Ericameria nauseosa*
GRAMINOID	*Bromus tectorum, Pleuraphis jamesii, Sporobolus cryptandrus*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs throughout the park in lower elevation alluvial flats, specifically Kolob Visitor Center, Hop Valley, Coal Pits Wash, Crater Hill, Dalton Wash, Pine Creek, Shune's Hollow, and Stave Springs.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH24, RH36, RH38, RH65, 30, 46, 52, 506, 507
Classification Confidence: 3 **Identifier:** CEGL002699
REFERENCES: None available.

ARTEMISIA TRIDENTATA / BOUTELOUA GRACILIS SHRUBLAND
Big Sagebrush / Blue Grama Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This shrubland has only been described from the plateaus and mesas of Grand Canyon and Zion national parks in northwestern Arizona and southwestern Utah, but it is more widespread and likely occurs in New Mexico and Nevada. Sites range from valley bottoms and drainages to rolling hills, mesa tops and terraces. Substrates are alluvial soils derived from limestone or volcanic flows or sandy-textured soil derived from sandstone or sandy limestone. Stands have an open, short-shrub canopy (less than 1 m tall) that is dominated by the evergreen microphyllous shrub *Artemisia tridentata* usually with greater than 20% cover. Other common shrubs and dwarf-shrubs may include *Gutierrezia sarothrae, Chrysothamnus viscidiflorus, Atriplex canescens, Krascheninnikovia lanata*, or *Ephedra viridis*. The sparse herbaceous layer is dominated by the short perennial bunchgrass *Bouteloua gracilis* with *Achnatherum hymenoides (= Oryzopsis hymenoides), Pascopyrum smithii*, or *Sporobolus cryptandrus* often present. Forbs are sparse. Scattered *Juniperus osteosperma* trees and succulents such as *Opuntia* spp. may also be present.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at 6100 feet on gently sloping terrace above wash. Soils are sandy and rapidly drained.

Global Environment: This shrubland has only been described from the plateaus and mesas of Grand Canyon and Zion national parks in northwestern Arizona and southwestern Utah, but it is more widespread and likely occurs in New Mexico and Nevada. Elevations range from 1370-2040 m. Sites range from valley bottoms and drainages to rolling hills, mesa tops and terraces. Substrates include sandy-textured soils derived from sandstone or sandy limestone and moderately deep, fine-textured, alkaline, calcareous, alluvial soils derived from limestone or volcanic flows.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Artemisia tridentata* is dominant with 15% cover and heights of 1-2 m. *Tetradymia canescens* codominates with 10% cover. The herbaceous layer is significant. *Bouteloua gracilis* dominates with 10% cover, and *Sporobolus cryptandrus*, 5% cover. Forb species present are *Penstemon* spp., *Hymenopappus filifolius, Lupinus sericeus*, and *Castilleja applegatei ssp. martinii*. Total vegetation cover is 30%.

Global Vegetation: This shrubland is characterized by an open, short-shrub canopy (less than 2 m tall) that is dominated by the evergreen microphyllous shrub *Artemisia tridentata* usually with greater than 20% cover. Other common shrubs and dwarf-shrubs may include *Gutierrezia sarothrae, Chrysothamnus viscidiflorus, Atriplex canescens, Ephedra viridis, Krascheninnikovia lanata*, or *Tetradymia canescens*. The sparse herbaceous layer is dominated by the short perennial bunchgrass *Bouteloua gracilis* with *Achnatherum hymenoides (= Oryzopsis hymenoides), Pascopyrum smithii*, or *Sporobolus cryptandrus* often present. Forbs are sparse but may include species of *Castilleja, Eriogonum, Lupinus*, and *Penstemon*. Scattered *Juniperus osteosperma* trees and succulents such as *Opuntia* spp. may also be present.

Global Dynamics: *Artemisia tridentata* shrubs are readily killed by fire and do not resprout (Wright et al. 1979). *Artemisia tridentata* will re-establish relatively quickly (about 10-20 years) if a seed source is nearby (Bunting 1987). If fire-return intervals are more frequent than 10 years then *Artemisia tridentata* has difficulty recovering (Bunting 1987, Everett 1987). However, this association has an open, short-shrub canopy and a relatively sparse herbaceous layer (low fine fuels to carry the fire), so it is unlikely that it would burn except under extreme conditions.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Artemisia tridentata, Tetradymia canescens*
GRAMINOID	*Bouteloua gracilis*

Global

Stratum	Species
SHORT SHRUB	*Artemisia tridentata, Gutierrezia sarothrae*
GRAMINOID	*Bouteloua gracilis*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Artemisia tridentata, Tetradymia canescens*
GRAMINOID	*Bouteloua gracilis, Sporobolus cryptandrus*

Global

Stratum	Species
SHORT SHRUB	*Artemisia tridentata*
GRAMINOID	*Bouteloua gracilis*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G4.

Global Comments: On Fishtail Mesa, cover of *Artemisia bigelovii* was lumped with *Artemisia tridentata* in plot summary tables as "*Artemisia*" by Jameson et al. (1962) and Rowlands and Brian (1996). It is not clear if these shrub species co-occurred within the plot sites or not.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled in Terry Wash, east of Cougar Mountain, in the Guardian Angels Quadrangle. It has also been observed in Shunes Hollow in the southeast corner of the park.

Global Range: This association is described from Zion and Grand Canyon national parks in southwestern Utah and northwestern Arizona. It is likely widespread across the Colorado Plateau and also may occur in New Mexico and Nevada.

Nations: US
States/Provinces: AZ UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 206. It's rather unusual for *Bromus tectorum* to be absent from this vegetation type. This could be considered TECA - EPVI Shrubland.
Classification Confidence: 2 **Identifier:** CEGL000995
REFERENCES: Bourgeron and Engelking 1994, Bunting 1987, Driscoll et al. 1984, Everett 1987, Jameson et al. 1962, Warren et al. 1982, Wright et al. 1979

III.A.4.N.a.18. ARTEMISIA TRIDENTATA SSP. TRIDENTATA SHRUBLAND ALLIANCE

Basin Big Sagebrush Shrubland Alliance

ARTEMISIA TRIDENTATA SSP. TRIDENTATA / PASCOPYRUM SMITHII - (ELYMUS LANCEOLATUS) SHRUBLAND

Basin Big Sagebrush / Western Wheatgrass - (Streamside Wild Rye) Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This sagebrush shrubland occurs on valley bottoms, stream terraces and other relatively mesic sites west of the Great Plains. Most stands grow on alluvial terraces in stream alluvium, although a few occur on upland swales. Soils generally are loamy or sandy. Water tables may be within 2 m of the soil surface. The stream channel often is dry and may be incised. The vegetation is characterized by a sparse to moderately dense short-shrub layer (up to about 35% canopy cover and to 1.5 m tall) that is dominated by *Artemisia tridentata ssp. tridentata*, with an herbaceous layer that usually dominated by *Pascopyrum smithii* or *Elymus lanceolatus*. Other shrubs may be present in small amounts, especially *Ericameria nauseosa (= Chrysothamnus nauseosus), Chrysothamnus viscidiflorus*, or *Quercus gambelii*. The sparse to dense herbaceous layer is dominated by graminoids and is poor in species richness relative to other sagebrush types. Other species that may be present in substantial amounts are *Elymus elymoides (= Sitanion hystrix)* in northern Colorado, *Poa secunda (= Poa nevadensis)* and *Muhlenbergia richardsonis*, in Nevada, and *Leymus cinereus* and *Poa pratensis* in Montana. Forbs contribute much less cover than do grasses. Mosses and lichens may be important ground cover.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at 6200 feet on a gentle southeast-facing slope as a part of wide valley landscape. Soils texture is sandy loam.

Global Environment: This sagebrush shrubland occurs on valley bottoms, stream terraces and other relatively mesic sites west of the Great Plains. Stands occur over an elevational range of 1800-2400 m (5900-7875 feet). Most stands grow on alluvial terraces in stream alluvium, although a few occur on upland swales. Soils generally are loamy or sandy. Water tables may be within 2 m of the soil surface. The stream channel often is dry and incised.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association is a part of a mosaic of oak islands and grasslands in the Lee Valley. *Artemisia tridentata ssp. tridentata* is 1 m high and has foliar cover of 10%. *Quercus gambelii* is present with insignificant cover. The herbaceous cover is dominated by *Elymus lanceolatus* with 30% cover. No other graminoids are present and forbs are nearly absent.

Global Vegetation: This association is characterized by a sparse to moderately dense short-shrub layer (up to about 35% canopy cover and to 1.5 m tall) that is dominated by *Artemisia tridentata ssp. tridentata*, with an herbaceous layer that usually dominated by *Pascopyrum smithii* or *Elymus lanceolatus*. Other shrubs may be present in small amounts, especially *Ericameria nauseosa (= Chrysothamnus nauseosus), Chrysothamnus viscidiflorus*, or *Quercus gambelii*. The sparse to dense herbaceous layer is dominated by graminoids and is poor in species richness relative to other sagebrush types. Other species that may be present in substantial amounts are *Elymus elymoides (= Sitanion hystrix)* in northern Colorado (Tiedemann et al. 1987), *Poa secunda (= Poa nevadensis)* and *Muhlenbergia richardsonis* in Nevada (Blackburn et al. 1971), and *Leymus cinereus* and *Poa pratensis* in Montana (Cooper et al. 1995). Forbs contribute much less cover than do grasses. Species that often occur are *Symphyotrichum ascendens (= Aster ascendens)* and *Collinsia parviflora* in Nevada (Blackburn et al. 1971), *Penstemon caespitosus* in north-central Colorado (Tiedemann et al. 1987), *Achillea millefolium, Erigeron compositus, Packera cana (= Senecio canus)*, and *Taraxacum officinale* in southwestern Montana (Cooper et al. 1995), and *Cordylanthus ramosus* in southwestern Wyoming (Jones and Fertig 1996). Mosses and lichens may be important ground cover.

Global Dynamics: *Artemisia tridentata* shrubs are killed by burns and do not resprout (Wright et al. 1979). *Artemisia tridentata* will re-establish relatively quickly (about 10-20 years) if a seed source is nearby (Bunting 1987). If fire-return intervals are more frequent than 10 years, then *Artemisia tridentata* has difficulty recovering (Bunting 1987, Everett 1987).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Artemisia tridentata ssp tridentata*
GRAMINOID	*Elymus lanceolatus*

Global

Stratum	Species
SHORT SHRUB	*Artemisia tridentata ssp tridentata*
GRAMINOID	*Elymus lanceolatus, Pascopyrum smithii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Artemisia tridentata ssp tridentata*
GRAMINOID	*Elymus lanceolatus, Pascopyrum smithii*

Global

Stratum	Species
SHORT SHRUB	*Artemisia tridentata ssp tridentata*
GRAMINOID	*Elymus lanceolatus, Pascopyrum smithii*

GLOBAL SIMILAR ASSOCIATIONS:

- Sarcobatus vermiculatus / Pascopyrum smithii - (Elymus lanceolatus) Shrub Herbaceous Vegetation (CEGL001508)--occupies soils with more salts.
- Artemisia tridentata ssp. wyomingensis / Pascopyrum smithii Shrubland (CEGL001047)--has a shrub layer dominated by that subspecies of big sagebrush and occupies drier sites.
- Artemisia tridentata ssp. tridentata / Pseudoroegneria spicata - Poa secunda Shrub Herbaceous Vegetation (CEGL001019)--generally has a more open shrub layer and an undergrowth dominated by *Pseudoroegneria spicata* rather than *Pascopyrum smithii* and grows on shallower soils.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G3?.

Global Comments: *Elymus lanceolatus* has been confused with *Pascopyrum smithii* in field studies. This association may include either or both species. Similar associations such as *Sarcobatus vermiculatus / Pascopyrum smithii - (Elymus lanceolatus) Shrub Herbaceous Vegetation (CEGL001508)* occupies soils with more salts. Stands of *Artemisia tridentata ssp. wyomingensis / Pascopyrum smithii* Shrubland (CEGL001047) have a shrub layer dominated by that subspecies of big sagebrush and occupy drier sites. *Artemisia tridentata ssp. tridentata / Pseudoroegneria spicata - Poa secunda* Shrub Herbaceous Vegetation (CEGL001019) generally has a more open shrub layer and undergrowth dominated by *Pseudoroegneria spicata* rather than *Pascopyrum smithii*; stands of this type grow on shallower soils.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled southeast of Firepit Knoll in the Guardian Angels quadrangle.

Global Range: This association occurs across the interior western U.S. from southwestern Montana, southwestern Wyoming, and north-central Colorado to southwestern Utah and northeastern Nevada. It may also occur in Washington, Oregon, and Idaho given the broad geographic ranges of *Artemisia tridentata ssp. tridentata* and *Pascopyrum smithii*.

Nations: US
States/Provinces: CO ID? MT NV OR? UT WA? WY

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH04
Classification Confidence: 1 **Identifier:** CEGL001017
REFERENCES: Beetle and Johnson 1982, Blackburn et al. 1971, Bourgeron and Engelking 1994, Bunting 1987, Cooper et al. 1995, Driscoll et al. 1984, Everett 1987, Francis 1983, Johnston 1987, Jones and Fertig 1996, Keammerer 1977, Strong 1980, Tiedemann et al. 1987, Wright et al. 1979

III.A.4.N.a.19. ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUBLAND ALLIANCE

Mountain Big Sagebrush Shrubland Alliance

ARTEMISIA TRIDENTATA SSP. VASEYANA / HESPEROSTIPA COMATA SHRUBLAND

Mountain Big Sagebrush / Needle-and-Thread Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at elevations ranging from 6100-7100 feet on flat to gently easterly sloping terrain. Soil texture is loamy sand.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association occurs in openings of *Pinus edulis / Juniperus osteosperma* woodlands or in a mosaic with *Quercus gambelii* shrubland islands. *Artemisia tridentata ssp. vaseyana* is dominant with 10-40% cover and less than 1 m in height. Other shrubs that may be present in the stand are *Purshia tridentata, Symphoricarpos oreophilus, Chrysothamnus viscidiflorus, Amelanchier utahensis*, and *Cercocarpus montanus*, all of minimal cover. The herbaceous layer can be significant and usually a combination of codominant graminoids, such as *Hesperostipa comata, Bouteloua gracilis, Poa fendleriana*, and *Muhlenbergia* spp. Total graminoid cover is 5-50%. Forbs are sparse and are inconsistent in composition among sites.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Artemisia tridentata ssp vaseyana*
GRAMINOID	*Bouteloua gracilis, Hesperostipa comata, Muhlenbergia* spp., *Poa fendleriana*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Artemisia tridentata ssp vaseyana, Chrysothamnus viscidiflorus, Purshia tridentata, Symphoricarpos oreophilus*
GRAMINOID	*Bouteloua gracilis, Hesperostipa comata, Muhlenbergia* spp., *Poa fendleriana*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Of all the references for this association, only Hironaka et al. (1983) clearly reference an *Artemisia tridentata ssp. vaseyana / Stipa comata* vegetation type. All the others (Blackburn 1967, Blackburn et al. 1968c, 1971, Tueller et al. 1966, 1974, Mclean 1970, Poulton 1955, DeVelice and Lesica 1993) do not provide information as to the subspecies of *Artemisia tridentata*. Further clarification of which published materials relate to this association is needed. Based on habitat information and photos available for the study areas in Nevada, these could reference *Artemisia tridentata ssp. tridentata / Stipa comata* vegetation types.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled in the northeastern region of the park, the mesa east of The Bishopric, and Deertrap Mountain.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: NV UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 124, 259, 261, 370, 375
Classification Confidence: 3 **Identifier:** CEGL002931
REFERENCES: Blackburn 1967, Blackburn et al. 1968c, Blackburn et al. 1971, DeVelice and Lesica 1993, Hironaka et al. 1983, McLean 1970, Poulton 1955, Tueller and Blackburn 1974, Tueller et al. 1966

III.A.4.N.a.23. ERICAMERIA NAUSEOSA SHRUBLAND ALLIANCE

Rubber Rabbitbrush Shrubland Alliance

ERICAMERIA NAUSEOSA / BROMUS TECTORUM SEMI-NATURAL SHRUBLAND

Rubber Rabbitbrush / Cheatgrass Semi-natural Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: Elevation ranges from 4000-5500 feet for this association on both steep and gentle slopes. Slopes are north-facing and have deep sandy soils.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Ericameria nauseosa* is the dominant shrub in this association with cover of 20-40%. *Rhus trilobata* and/or *Artemisia tridentata* are occasionally present. *Yucca elata var. utahensis* and *Opuntia macrorhiza* are present to abundant. The herbaceous layer has sparse to high cover of the exotic *Bromus tectorum*, and *Sporobolus cryptandrus* is present, but with minimal cover. Few other herbaceous species are present.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Ericameria nauseosa, Opuntia macrorhiza*
GRAMINOID	*Bromus tectorum*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Ericameria nauseosa, Opuntia macrorhiza, Rhus trilobata, Yucca elata var utahensis*
GRAMINOID	*Bromus tectorum, Sporobolus cryptandrus*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs below the Watchman near the west entrance of Zion National Park and in the drainage basin above the Watchman. It has also been observed in Shune's Creek and scattered throughout the park in disturbed areas.

Global Range: This association has currently only been described from Zion NP in southwestern Utah, but is likely more widespread throughout the western U.S. in disturbed areas.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 109, 385
Classification Confidence: 3 **Identifier:** CEGL002937
REFERENCES: None available.

III.A.4.N.a.21. PURSHIA (STANSBURIANA, MEXICANA) SHRUBLAND ALLIANCE

(Stansbury Cliff-rose, Mexican Cliff-rose) Shrubland Alliance

PURSHIA STANSBURIANA - ARCTOSTAPHYLOS PATULA SHRUBLAND [PROVISIONAL]

Stansbury Cliff-rose - Greenleaf Manzanita Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at elevations of approximately 7000 feet on the Twin Brothers mesa top and the steeply sloped mesa rim of Towers of the Virgin. Soils are sandy.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Stands of *Purshia mexicana / Arctostaphylos patula* are not widespread in Zion National Park and are likely confined to the vicinity where they were sampled. Stands with *Pinus edulis* in the tree canopy occur at lower elevations. *Purshia stansburiana (= Purshia mexicana ssp. stansburiana)* is the dominant tall shrub in this association with cover of 20-30%. *Amelanchier utahensis* and *Quercus gambelii* are present to abundant in the tall-shrub layer. *Arctostaphylos patula* occurs in the short-shrub layer with 50% cover. Subshrubs present are often *Gutierrezia sarothrae* and *Opuntia* spp. *Poa fendleriana* and *Phlox austromontana* are commonly present in the herbaceous layer.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Purshia stansburiana*
SHORT SHRUB	*Arctostaphylos patula*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Amelanchier utahensis, Purshia stansburiana, Quercus gambelii*
SHORT SHRUB	*Arctostaphylos patula*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled on Towers of the Virgin and Twin Brothers Mesa, both located in the Springdale East quadrangle in Zion National Park.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 269, AA317. AA plot 142 does not have ARPA, but still resembles this association.
Classification Confidence: **Identifier:** CEGL002948
REFERENCES: None available.

III.A.4.N.c. Temporarily flooded microphyllous shrubland

III.A.4.N.c.1. TAMARIX SPP. SEMI-NATURAL TEMPORARILY FLOODED SHRUBLAND ALLIANCE

Salt-cedar species Semi-natural Temporarily Flooded Shrubland Alliance

TAMARIX SPP. TEMPORARILY FLOODED SHRUBLAND

Salt-cedar species Temporarily Flooded Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This broadly defined association is composed of shrublands which form moderately dense to dense thickets on banks of larger streams across the western Great Plains, interior and southwestern U.S. and northern Mexico. Stands are dominated by introduced species of *Tamarix*, including *Tamarix ramosissima, Tamarix chinensis, Tamarix gallica*, and *Tamarix parviflora*. *Tamarix* spp. were introduced from the Mediterranean and have become naturalized in various sites, including salt flats and other saline habitats, springs, and especially along streams and regulated rivers, where it replaces the native vegetation, such as shrublands dominated by species of *Salix* or *Prosopis*. A remnant herbaceous layer may be present, depending on the age and density of the shrub layer. *Tamarix* species have become a critical nuisance along most large rivers in the semi-arid West and, because of the difficulty to remove, may have irreversibly changed the vegetation on many sites.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Palustrine

Zion National Park Environment: This association was not sampled at Zion NP, but occurred in the environs and was mapped.

Global Environment: These widespread shrublands are common along larger streams, rivers, and around playas in the western U.S. and Mexico. Elevation ranges from 75 m below sea level to 1860 m. *Tamarix* spp. have become naturalized in various sites including riverbanks, floodplains, basins, sandbars, side channels, springs, salt flats, and other saline habitats. Stands grow especially well along regulated rivers where flood-regenerated native species like *Populus* are declining. Substrates are commonly thin sandy loam soil over alluvial deposits of sand, gravel or cobbles.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association was not sampled at Zion NP, but occurred in the environs and was mapped.

Global Vegetation: This semi-natural shrubland occurs along streams, rivers and playas where it forms a moderate to dense tall-shrub layer that is solely or strongly dominated by species of *Tamarix* including *Tamarix ramosissima, Tamarix chinensis, Tamarix gallica*, and *Tamarix parviflora*. Other shrubs may include species of *Salix* (especially *Salix exigua*) and *Prosopis, Rhus trilobata*, and *Sarcobatus vermiculatus* but with low cover (if shrub species are codominant then stand is classified as a natural shrubland). Scattered *Acer negundo, Salix amygdaloides, Populus* spp., or *Elaeagnus angustifolia* trees may also be present. Depending on stand age and density of the shrub layer, an herbaceous layer may be present. Associated species include *Distichlis spicata, Sporobolus airoides*, and introduced forage species such as *Agrostis gigantea, Agrostis stolonifera*, and *Poa pratensis*. Introduced herbaceous species such as *Polypogon monspeliensis, Conyza canadensis, Lepidium latifolium*, and others have been reported from shrublands in this association.

Global Dynamics: *Tamarix* spp. are highly competitive shrubs that have invaded many riparian and wetland environments in the western U.S. Hansen et al. (1995) report that these shrubs are extremely drought- and salt-tolerant, produce prolific wind-dispersed seeds over much of the growing season, can resprout after burning or cutting, and if kept moist, buried or broken branches will develop adventitious roots and grow. Stands seem to favor disturbed and flow-regulated rivers, but establish well in pristine areas, too. Under optimum conditions riparian areas can be converted to a dense thicket in less than 10 years (Hansen et al. 1995). Once established, stands are extremely difficult to eradicate, requiring cutting with herbicide application on stumps to prevent resprouting (Smith 1989).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Tamarix ramosissima, Tamarix chinensis, Tamarix gallica*, and *Tamarix parviflora*
GRAMINOID	*Bromus rigidus, Poa fendleriana, Poa pratensis*

Global

Stratum	Species
TALL SHRUB	*Tamarix ramosissima, Tamarix chinensis, Tamarix gallica*, and *Tamarix parviflora*
SHORT SHRUB	*Symphoricarpos oreophilus*
GRAMINOID	*Distichlis spicata, Poa fendleriana, Sporobolus airoides*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Tamarix ramosissima, Tamarix chinensis, Tamarix gallica*, and *Tamarix parviflora*

Global

Stratum	Species
TALL SHRUB	*Tamarix ramosissima, Tamarix chinensis, Tamarix gallica*, and *Tamarix parviflora*

OTHER NOTEWORTHY SPECIES

Global

Stratum	Species
GRAMINOID	*Bromus tectorum*

GLOBAL SIMILAR ASSOCIATIONS:

- Tamarix spp. - (Baccharis halimifolia) Shrubland (CEGL004918)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: GW.

Global Comments: *Tamarix* spp. Temporarily Flooded Shrubland (CEGL003114) is a broadly defined plant association that is composed of many diverse *Tamarix* spp.-dominated vegetation communities from a wide variety of environments. Muldavin et al. (2000a) described 8 community types that will be reviewed as possible USNVC associations.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was not sampled at Zion NP, but occurred in the environs and was mapped. It likely occurs in lowlands along stream channels and in disturbed riparian forest in canyons.

Global Range: This semi-natural shrubland is found along drainages in the semi-arid western Great Plains, interior and southwestern U.S. and northern Mexico, from central and eastern Montana, south to Colorado, western Oklahoma and Texas, west to California.

Nations: MX US
States/Provinces: AZ CA CO MT MXCH MXCO MXSO NM NV OK TX UT WY?

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: None
Classification Confidence: 2 **Identifier:** CEGL003114
References: Baalman 1965, Cowardin et al. 1979, Hansen et al. 1995, Hoagland 2000, Holland 1986b, Muldavin et al. 2000a, Nachlinger and Reese 1996, Ortenberger and Bird 1933, Paysen et al. 1980, Sawyer and Keeler-Wolf 1995, Smith 1989, Stevens and Shannon 1917, Szaro 1989, Ungar 1968, Von Loh et al. 2002, Ware and Penfound 1949

III.A.5.N.a. Broad-leaved and microphyllous evergreen extremely xeromorphic subdesert shrubland

III.A.5.N.a.11. EPHEDRA NEVADENSIS SHRUBLAND ALLIANCE

Nevada Joint-fir Shrubland Alliance

EPHEDRA NEVADENSIS BASALT SHRUBLAND [PROVISIONAL]

Nevada Joint-fir Basalt Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This stand of *Ephedra nevadensis* occurs on a basalt outcrop at 4100 feet. The slope is gentle with a southerly aspect. Exposed soils are minimal and have clay loam texture. Most of soil is covered with small and large lava rocks.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Ephedra nevadensis* dominates this association with cover of 30%. *Gutierrezia sarothrae, Atriplex canescens*, and *Echinocereus engelmannii* are present but contribute minimal cover. The herbaceous layer is normally very sparse.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Ephedra nevadensis*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Atriplex canescens, Ephedra nevadensis, Gutierrezia sarothrae*
GRAMINOID	*Achnatherum hymenoides, Bromus tectorum, Hesperostipa comata, Sporobolus cryptandrus*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on the Rockville Bench at the southern boundary of the park.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 516
Classification Confidence: **Identifier:** CEGL002936
REFERENCES: None available.

III.A.5.N.a.12. EPHEDRA VIRIDIS SHRUBLAND ALLIANCE

Mormon-tea Shrubland Alliance

TETRADYMIA CANESCENS - EPHEDRA VIRIDIS SHRUBLAND [PROVISIONAL]

Gray Horsebrush - Mormon-tea Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs in sandy soils of slickrock basins on flat to moderate slopes with variable aspects. Elevation ranges 5600 to 6000 feet.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Tetradymia canescens* is the dominant shrub with 10-40% cover. *Ephedra* viridis and *Artemisia tridentata* are almost always present, sometimes with as much cover as *T. canescens*. The shrub layer is usually diverse with combinations of *Ephedra viridis, Artemisia tridentata, Ericameria nauseosa, Quercus gambelii, Amelanchier utahensis, Purshia tridentata*, and *Purshia stansburiana*. Combined shrub cover is approximately 50%. Herbaceous cover is minimal and may consist of *Bromus tectorum, Bouteloua gracilis, Muhlenbergia pungens*, and *Sporobolus cryptandrus*. This association was observed during the Accuracy Assessment phase of project and needs more data collected to fully describe it.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Tetradymia canescens,Ephedra viridis, Ericameria nauseosa, Quercus gambelii*
GRAMINOID	*Bouteloua gracilis, Bromus tectorum*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Ephedra viridis, Tetradymia canescens*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs in the slickrock region of the park that exists predominantly east of the tunnel and both north and south of Highway 9.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 47, 510. AA plots: 21, 40, 129
Classification Confidence: 3 **Identifier:** CEGL002973
REFERENCES: None available.

III.A.5.N.b. Facultatively deciduous extremely xeromorphic subdesert shrubland

III.A.5.N.b.6. ATRIPLEX CANESCENS SHRUBLAND ALLIANCE
Fourwing Saltbush Shrubland Alliance

ATRIPLEX CANESCENS - ARTEMISIA TRIDENTATA SHRUBLAND

Fourwing Saltbush - Big Sagebrush Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This shrubland is found in the Colorado Plateau, Great Basin, and Mojave Desert. Stands occur on level plains, valley bottoms, stream terraces, low and mid-slopes. Slopes are typically less than 25% and it is found on all aspects. Substrates are well-drained, silty loam and clay fine-textured soils. Some stands may be subject to periodic flooding. Evidence of erosion such as rills and gullies is common. The vegetation is characterized by a sparse to moderately dense short-shrub layer (15-35% cover) that is codominated by *Atriplex canescens* and *Artemisia tridentata*. Associated shrubs include *Chrysothamnus viscidiflorus, Ephedra nevadensis, Ericameria nauseosa, Gutierrezia* spp.*, Krascheninnikovia lanata, Lycium* spp., and *Opuntia* spp. The sparse to moderately dense herbaceous layer (10-20% cover) is dominated by graminoids with scattered forbs. *Achnatherum hymenoides, Bouteloua gracilis, Elymus elymoides*, and *Pascopyrum smithii* are common grasses. Forbs may include species of *Cirsium, Eriogonum, Penstemon*, or *Sphaeralcea*. Introduced species such as *Agropyron cristatum, Bromus rubens*, and *Bromus tectorum* are common in disturbed stands.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at 3800-4500 feet on alluvial flats or benches with southerly aspects. Soil texture is loamy sand.

Global Environment: This shrubland is found in the Colorado Plateau, Great Basin, and Mojave Desert. Elevation ranges from 1160-2100 m (3800-6900 feet). Stands occur on level plains, valley bottoms, stream terraces, low and mid-slopes . Slopes are typically less than 25%. It occurs on all aspects, but east- and southeast-facing slopes are common, Substrates are well-drained, silty loam and clay fine-textured soils. Some stands may be subject to periodic flooding. Evidence of erosion such as rills and gullies is common (Warren et al.1982).

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Atriplex canescens* and *Artemisia tridentata* codominate this association, each with 5-10% cover. Other shrubs present at the sampled sites are *Ephedra nevadensis, Ericameria nauseosa, Chrysothamnus viscidiflorus*, and *Gutierrezia microcephala*. Total shrub cover is 10-15%. Herbaceous cover is very sparse and variable. *Bromus tectorum* is often present and may have 10% cover. Forbs present at the sampled sites are *Sphaeralcea coccinea, Lactuca serriola, Euphorbia* spp., and *Eriogonum inflatum*.

Global Vegetation: This association is characterized by a sparse to moderately dense short-shrub layer (10-35% cover) that is codominate by *Atriplex canescens* and *Artemisia tridentata*. Associated shrubs include *Chrysothamnus viscidiflorus, Ephedra nevadensis, Ericameria nauseosa, Gutierrezia microcephala, Gutierrezia sarothrae, Krascheninnikovia lanata, Lycium* spp., and *Opuntia* spp (Roberts et al. 1992, Warren et al. 1982). The sparse to moderately dense herbaceous layer (10-20% cover) is dominated by graminoids with scattered forbs. *Achnatherum hymenoides, Bouteloua gracilis, Elymus elymoides*, and *Pascopyrum smithii* are common grasses. Forbs may include *Cirsium neomexicanum, Eriogonum inflatum, Eriogonum racemosum, Penstemon* spp., or *Sphaeralcea coccinea*. Introduced species such as *Agropyron cristatum, Bromus rubens*, *Bromus tectorum,* and *Lactuca serriola* are common in disturbed stands.

Global Dynamics: *Atriplex canescens* is tolerant of fire and generally sprouts vigorously from the root crown after burning (Wright 1980). It often recovers fully within 2 or 3 years after a burn (Wright 1980). However, *Artemisia tridentata* shrubs are readily killed by fire and do not resprout (Wright et al. 1979). *Artemisia tridentata* will re-establish relatively quickly (about 10-20 years) if a seed source is nearby (Bunting 1987). If fire-return intervals are more frequent than 10 years, then *Artemisia tridentata* has difficulty recovering (Bunting 1987, Everett 1987).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Artemisia tridentata, Atriplex canescens*

Global

Stratum	Species
SHORT SHRUB	*Artemisia tridentata, Atriplex canescens*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Artemisia tridentata, Atriplex canescens, Chrysothamnus viscidiflorus, Ephedra nevadensis, Ericameria nauseosa*
GRAMINOID	*Bromus tectorum*
FORB	*Sphaeralcea coccinea*

Global

Stratum	Species
SHORT SHRUB	*Artemisia tridentata, Atriplex canescens*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G4.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: Stands of *Atriplex canescens - Artemisia tridentata* occur at the southern boundary of the park and are likely to extend to the south outside the boundary. This association was sampled at Dalton Wash and near Coal Pits Wash.

Global Range: This shrubland occurs in the Colorado Plateau, Great Basin, and Mojave Desert.

Nations: US
States/Provinces: AZ CA? NV? UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH35, RH44. This association was never seen during Accuracy Assesments.
Classification Confidence: 2 **Identifier:** CEGL001282
REFERENCES: Bourgeron and Engelking 1994, Bunting 1987, Driscoll et al. 1984, Everett 1987, Roberts et al. 1992, Warren et al. 1982, Wright 1980, Wright et al. 1979

ATRIPLEX CANESCENS SHRUBLAND

Fourwing Saltbush Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This shrubland association is known from the Great Basin north into southern Columbia Basin and east into Wyoming and the Colorado Plateau. It is common on middle elevation bajadas in deep, sandy soils , but will occur at lower elevations along alluvial benches where soils are often finer-textured and possibly saline/alkaline. Parent material includes volcanic tuff, shale and sandstone. The vegetation is characterized by a sparse to moderately dense shrub layer (10-35% cover) dominated or codominated by *Atriplex canescens* typically with a variable and often sparse herbaceous layer. Notable codominants in the shrub layer include *Chrysothamnus viscidiflorus, Coleogyne ramosissima, Ephedra nevadensis, Eriogonum kearneyi, Grayia spinosa, Gutierrezia sarothrae, Lycium pallidum*, or *Psorothamnus* spp. *Ephedra viridis* may be present but is not a codominant. The typically sparse herbaceous layer includes low cover of species such as *Achnatherum hymenoides*, *Aristida purpurea, Elymus elymoides, Pleuraphis jamesii,* and *Sporobolus cryptandrus*. Common forb species on sandy sites include *Cymopterus ripleyi, Dalea searlsiae, Lesquerella ludoviciana*, and *Oenothera pallida*. Winter annual forb cover is variable depending on annual precipitation. Introduced species such as *Bromus tectorum, Bromus diandrus*, and *Salsola kali* are common on disturbed sites.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at 3800-4000 feet on an alluvial flat and eroded bench, with clay loam and sandy soils.

Global Environment: This shrubland association is known from the Great Basin north into southern Columbia Basin and east into Wyoming and Colorado Plateau. It is common on deep, sandy soils on middle elevation bajadas (1370-1680 m, 4500-5500 feet), but will occur at lower elevations (down to 610 m, 2000 feet) along alluvial benches where soils are often finer-textured and possibly saline/alkaline (Beatley 1976). Parent materials include volcanic tuff, shale and sandstone. At lower elevations, it often occurs as a mosaic with *Lycium pallidum - Grayia spinosa*- or *Atriplex confertifolia*-dominated shrublands.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Atriplex canescens* has 5-30% cover. Other shrubs present with usually less than 5% cover are *Coleogyne ramosissima, Lycium pallidum, Psorothamnus fremontii, Ephedra nevadensis*, and *Gutierrezia sarothrae*. The herbaceous layer has 10-90% cover. Herbaceous species present in the sampled stands and observations are *Bromus tectorum, Bromus diandrus, Achnatherum hymenoides, Aristida purpurea, Sporobolus cryptandrus, Pleuraphis jamesii*, and *Elymus elymoides*. Near the visitor's center, this association's herbaceous layer is dominated by *Bromus diandrus*. Forbs are very sparse and inconsistent in composition among sampled sites.

Global Vegetation: This association is characterized by a sparse to moderately dense shrub layer (10-35% cover) dominated or codominated by *Atriplex canescens* typically with a variable and often sparse herbaceous layer. Notable codominants in the shrub layer include *Chrysothamnus viscidiflorus, Coleogyne ramosissima, Ephedra nevadensis, Eriogonum kearneyi, Grayia spinosa, Gutierrezia sarothrae, Lycium pallidum, Psorothamnus fremontii*, or *Psorothamnus polydenius*. *Ephedra viridis* may be present but is not a codominant. The typically sparse herbaceous layer includes low cover of species such as *Achnatherum hymenoides (= Oryzopsis hymenoides)*, *Aristida purpurea, Elymus elymoides, Pleuraphis jamesii (= Hilaria jamesii),* and *Sporobolus cryptandrus*. Common forb species on sandy sites include *Cymopterus ripleyi, Dalea searlsiae,. Lesquerella ludoviciana*, and *Oenothera pallida*. Winter annual forb cover is variable depending on annual precipitation. Introduced species such as *Bromus tectorum, Bromus diandrus*, and *Salsola kali* are common on disturbed sites.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHRUB	*Atriplex canescens*
GRAMINOID	*Bromus diandrus, Bromus tectorum*

Global

Stratum	Species
SHORT SHRUB	*Atriplex canescens*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHRUB	*Atriplex canescens*
GRAMINOID	*Bromus diandrus, Bromus tectorum*

Global

Stratum	Species
SHORT SHRUB	*Atriplex canescens*

GLOBAL SIMILAR ASSOCIATIONS:

- Atriplex canescens - Artemisia tridentata Shrubland (CEGL001282)
- Atriplex canescens / Calycoseris parryi Shrubland (CEGL001284)
- Atriplex canescens - Krascheninnikovia lanata Shrubland (CEGL001285)
- Atriplex canescens / Purshia stansburiana Shrubland (CEGL001286)
- Atriplex canescens - Ephedra viridis Shrubland (CEGL001287)
- Atriplex canescens / Pleuraphis jamesii Shrubland (CEGL001288)
- Atriplex canescens / Achnatherum hymenoides Shrubland (CEGL001289)
- Atriplex canescens / Sporobolus airoides Shrubland (CEGL001291)
- Artemisia tridentata - Atriplex canescens - Sarcobatus vermiculatus / (Achnatherum hymenoides) Shrubland (CEGL001355)
- Prosopis glandulosa / Atriplex canescens Shrubland (CEGL001382)
- Gutierrezia sarothrae - Krascheninnikovia lanata - Atriplex canescens / Bouteloua eriopoda Shrub Herbaceous Vegetation (CEGL001733)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs in Parunaweep Canyon, Huber Wash and lower sections of the Virgin River corridor. It occurs infrequently in small stands on alluvial flats or benches near the southern boundary of the park.

Global Range: This shrubland association may occur throughout much of the interior western U.S. It is known from southern Columbia Basin and Great Basin east into Wyoming and Colorado Plateau.

Nations: US
States/Provinces: CA NV UT WY

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 39, 517. AA plots: 225, 119, 118, 108
Classification Confidence: 2 **Identifier:** CEGL001281
REFERENCES: Beatley 1976, Bourgeron and Engelking 1994, Driscoll et al. 1984, Ostler et al. 2000

III.A.5.N.b.11. COLEOGYNE RAMOSISSIMA SHRUBLAND ALLIANCE
Blackbrush Shrubland Alliance

COLEOGYNE RAMOSISSIMA / PLEURAPHIS JAMESII SHRUBLAND

Blackbrush / James' Galleta Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This shrubland association occurs in the Colorado Plateau and Mojave Desert in areas with hot summers and cold winters. Sites are gently sloping to flat. Substrates are variable and range from deep, well-drained, sandy soils derived from sandstone to rocky, clayey soils. The vegetation is characterized by an open (10-30% cover) short-shrub layer that is dominated by the deciduous, microphyllous shrub *Coleogyne ramosissima* with a sparse to moderately dense perennial graminoid layer that is dominated or codominated by *Pleuraphis jamesii*. Shrub associates may be present including *Atriplex canescens, Ephedra nevadensis, Ericameria nauseosa, Gutierrezia sarothrae*, and *Opuntia* spp. *Achnatherum hymenoides, Calochortus nuttallii*, and several annuals may be present to abundant in the herbaceous layer, especially during wet years. Cover of introduced annual *Bromus* species may be high in disturbed stands. Occasional *Juniperus osteosperma* or *Pinus edulis* trees are present in some stands.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association was documented on flat terrain with sandy or clayey, rocky soils at elevations of 4000 feet.

Global Environment: This shrubland association occurs in the Colorado Plateau and Mojave Desert in areas with hot summers and cold winters. Elevation ranges from 1200-1525 m (3950-5000 feet). Sites are gently sloping to flat. Substrates are variable and range from deep, well-drained, sandy soils derived from sandstone to rocky clayey soils (Utah Environmental and Agricultural Consultants 1973).

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Coleogyne ramosissima* is the dominant species in this association, though cover is a sparse 10-20%. *Ephedra nevadensis* and *Gutierrezia sarothrae* are usually present. *Pleuraphis jamesii* is well represented in the shrub interspaces at 10% foliar cover. Presence of other herbaceous species is minimal to absent.

Global Vegetation: The vegetation is characterized by an open (10-30% cover) short-shrub layer that is dominated by the deciduous, microphyllous shrub *Coleogyne ramosissima* with a sparse to moderately dense perennial graminoid layer that is dominated or codominated by *Pleuraphis jamesii*. Shrub associates may be present including *Atriplex canescens, Ephedra nevadensis, Ericameria nauseosa, Gutierrezia sarothrae*, and *Opuntia* spp. *Achnatherum hymenoides, Calochortus nuttallii*, and several annuals such as *Astragalus* sp. *Eriogonum nutans, Ipomopsis polycladon*, and *Phacelia ivesiana* may be present to abundant in the herbaceous layer, especially during wet years. Cover of introduced annual *Bromus* species may be high in disturbed stands. Occasional *Juniperus osteosperma* or *Pinus edulis* trees are present in some stands.

Global Dynamics: *Coleogyne ramosissima* is very sensitive to fire because it does not resprout after burning, and seeds in the seed bank are short-lived and destroyed by fire (Bowns and West 1976, Wright 1980). It is slow to recolonize burns, often requiring over 60 years to re-establish (Wright 1980). Burned-over areas often convert to *Gutierrezia microcephala*- or *Artemisia tridentata*-dominated shrublands (Bowns and West 1976). Invasion of introduced annual *Bromus* spp. creates a fire hazard and increases fire frequency (Warren et al. 1982).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Coleogyne ramosissima, Gutierrezia sarothrae*
GRAMINOID	*Pleuraphis jamesii*

Global

Stratum	Species
SHORT SHRUB	*Coleogyne ramosissima, Ephedra nevadensis, Gutierrezia sarothrae*
GRAMINOID	*Pleuraphis jamesii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Coleogyne ramosissima, Ephedra nevadensis, Gutierrezia sarothrae*
GRAMINOID	*Pleuraphis jamesii*

Global

Stratum	Species
SHORT SHRUB	*Coleogyne ramosissima, Ephedra nevadensis, Gutierrezia sarothrae*
GRAMINOID	*Pleuraphis jamesii*

GLOBAL SIMILAR ASSOCIATIONS:

- Coleogyne ramosissima Shrubland (CEGL001332)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: This association is similar to the broadly-defined *Coleogyne ramosissima* Shrubland (CEGL001332). This association is separated only by the presence of a *Pleuraphis jamesii*- dominated herbaceous layer. More classification work in needed to fully describe each association.

ELEMENT DISTRIBUTION

Zion National Park Range: Stands of *Coleogyne ramosissima / Pleuraphis jamesii* occur in the foothills near the southern boundary of Zion National Park. Stands were documented in the Springdale West quadrangle and are expected to be uncommon within the park boundaries.

Global Range: This shrubland association occurs in the Colorado Plateau and Mojave Desert.

Nations: US
States/Provinces: AZ? CA? CO UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 502, 514
Classification Confidence: 2 **Identifier:** CEGL001334
REFERENCES: Bourgeron and Engelking 1994, Bowns and West 1976, Driscoll et al. 1984, Utah Environmental and Agricultural Consultants 1973, Warren et al. 1982, Wright 1980

COLEOGYNE RAMOSISSIMA SHRUBLAND

Blackbrush Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This broadly defined shrubland association occurs in the Colorado Plateau, southern Great Basin, Mojave Desert, and Sierra Nevada foothills in areas with hot summers and cold winters. Sites are gently sloping to flat. In Nevada, stands occur on lower foothills and upper bajadas often with cooler northern and eastern aspects. Substrates tend to be shallow, calcareous, sandy- or loamy-textured soils, often with a caliche subhorizon. Gravel, boulders and rock outcrops are common in many stands. The vegetation has an open to moderately dense short-shrub layer (10-50% cover) that is dominated by *Coleogyne ramosissima*. It can occur in almost pure stands. Other shrubs and dwarf-shrubs may be present with low cover including *Ambrosia dumosa, Atriplex* spp., *Chrysothamnus viscidiflorus, Ephedra* spp., *Ericameria* spp., *Gutierrezia* spp., *Krascheninnikovia lanata, Lycium* spp., *Menodora spinescens, Opuntia* spp., and *Yucca baccata*. Occasional *Juniperus* spp., *Pinus edulis*, or *P. monophylla* trees may be present. The herbaceous layer is usually sparse, except during wet years when cover of annuals may be high. Introduced annual *Bromus* spp. may have high cover in disturbed stands.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: Stands of blackbrush are positioned on lowslopes, ridgetops, or interfluves at elevations of 3500-4000 feet. The terrain naturally decreases in elevation in a southerly and westerly direction from the higher plateaus and mesas of the park, and this association occurs on the lower foothills on eastern, southern, and western aspects. Soils that support these shrublands are for the most part fine, well-drained loamy sands.

Global Environment: This broadly defined shrubland association occurs in the Colorado Plateau, southern Great Basin, Mojave Desert, and Sierra Nevada foothills in areas with hot summers and cold winters. Elevations range from 1190-2133 m (3900-7000). Sites are gently sloping to flat. In Nevada, stands occur on lower foothills and upper bajadas often with cooler northern and eastern aspects. The upper elevation ecotones are generally narrow and *Coleogyne ramosissima* may mix with *Artemisia* spp., but the lower elevation ecotones tend to be broader and *Coleogyne ramosissima* may mix with communities dominated by *Larrea tridentata, Ambrosia dumosa, Atriplex* spp., or *Grayia spinosa* (Beatley 1976). Stands described from the Colorado Plateau often occur in a mosaic with pinyon-juniper woodlands (Warren et al. 1982). Substrates tend to be shallow, calcareous, sandy- or loamy-textured soils, often with a caliche subhorizon. Gravel, boulders and rock outcrops are common in many stands.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Coleogyne ramosissima* ranges from 10-40% foliar cover in this shrubland association. Other shrubs and subshrubs, such as *Ephedra nevadensis, Ephedra viridis, Gutierrezia sarothrae, Gutierrezia microcephala*, and *Atriplex canescens*, are commonly associated with blackbrush stands in the park and contribute from 5-20% cover. Total foliar cover is usually less than 40%. Though generally sparse, *Bromus tectorum* is commonly found scattered throughout under the shrubs and in the interspaces. Bunch grasses *Sporobolus cryptandrus* and *Pleuraphis jamesii* may also be present in some stands. *Juniperus osteosperma* trees or seedlings occur occasionally in this shrubland association, as well as subshrubs *Yucca baccata* and *Opuntia macrorhiza*.

Global Vegetation: This association has an open to moderately dense (10-50% cover) short-shrub layer that is dominated by the deciduous, microphyllous shrub *Coleogyne ramosissima*. It can occur in almost pure stands. Other shrub and dwarf-shrub species may be present with low cover including *Ambrosia dumosa, Atriplex canescens, A. confertifolia, Chrysothamnus viscidiflorus, Ephedra funerea, E. nevadensis, E. viridis, Ericameria linearifolia, E. teretifolia, Gutierrezia sarothrae, G. microcephala, Krascheninnikovia lanata, Lycium* spp., *Menodora spinescens, Opuntia* spp., and *Yucca baccata*. Occasional *Juniperus* spp., *Pinus edulis*, or *Pinus monophylla* trees are present in some stands. The herbaceous layer generally includes sparse cover of graminoids and forbs, except during wet years when cover of annuals may be high. Cover of introduced annual *Bromus* spp. may be high in disturbed stands.

Global Dynamics: *Coleogyne ramosissima* is very sensitive to fire because it does not resprout after burning, and seeds in the seed bank are short-lived and destroyed by fire (Bowns and West 1976, Wright 1980). It is slow to recolonize burns often requiring over 60 years to re-establish (Wright 1980). Burned-over areas convert to *Gutierrezia microcephala*- or *Artemisia tridentata*-dominated shrublands (Bowns and West 1976). Invasion of introduced annual *Bromus* spp. creates a fire hazard and increases fire frequency (Warren et al. 1982).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Atriplex canescens, Coleogyne ramosissima, Ephedra nevadensis, Gutierrezia microcephala, Gutierrezia sarothrae*
GRAMINOID	*Bromus tectorum, Pleuraphis jamesii, Sporobolus cryptandrus*

Global

Stratum	Species
SHORT SHRUB	*Atriplex canescens, Coleogyne ramosissima, Ephedra nevadensis, Gutierrezia microcephala*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Coleogyne ramosissima*
GRAMINOID	*Bromus tectorum, Pleuraphis jamesii, Sporobolus cryptandrus*

Global

Stratum	Species
SHORT SHRUB	*Coleogyne ramosissima*

GLOBAL SIMILAR ASSOCIATIONS:

- Pinus edulis - Juniperus osteosperma / Coleogyne ramosissima Woodland (CEGL000781)
- Quercus turbinella - Coleogyne ramosissima Shrubland (CEGL000982)
- Coleogyne ramosissima - Eriogonum fasciculatum Shrubland (CEGL001333)
- Coleogyne ramosissima / Pleuraphis jamesii Shrubland (CEGL001334)
- Larrea tridentata - Coleogyne ramosissima Shrubland (CEGL002717)
- Coleogyne ramosissima - Thamnosma montana Shrubland (CEGL002718)
- Coleogyne ramosissima - Purshia stansburiana Shrubland (CEGL002720)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G4G5.

Global Comments: This widespread plant association is broadly defined by the strong dominance of *Coleogyne ramosissima* without diagnostic codominate shrub or herbaceous species. It is similar to the broadly defined *Coleogyne ramosissima / Pleuraphis jamesii* Shrubland (CEGL001334) and is separated only by the lack of a *Pleuraphis jamesii*- dominated herbaceous layer. More classification work is needed to fully describe each association.

ELEMENT DISTRIBUTION

Zion National Park Range: These shrublands occur on the southwest edge of the Springdale West quadrangle and the Zion National Park boundary. Extensive contiguous stands cover the low-elevation hills, ridges and alluvial terraces of Coalpits and Huber Wash and extend southward to uplands or benches of the Virgin River corridor.

Global Range: This widespread desert shrubland association occurs in the Colorado Plateau, southern Great Basin, Mojave Desert, and Sierra Nevada foothills.

Nations: US
States/Provinces: AZ CA NV UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH47, RH82, RH83, 501
Classification Confidence: 2 **Identifier:** CEGL001332
REFERENCES: Annable 1985, Armstrong 1969, BIA 1979, Beatley 1976, Bourgeron and Engelking 1994, Bowns and West 1976, Bradley 1964, Callison et al. 1985, Driscoll et al. 1984, Ostler et al. 2000, Peterson 1984, Schultz et al. 1987, Shields et al. 1959, Warren et al. 1982, Wells 1960, West 1983d, Wright 1980

III.B.2.N.a. Temperate cold-deciduous shrubland

III.B.2.N.a.23. AMELANCHIER UTAHENSIS SHRUBLAND ALLIANCE

Utah Serviceberry Shrubland Alliance

AMELANCHIER UTAHENSIS SHRUBLAND

Utah Serviceberry Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This mountain shrubland association occurs in the foothills, mountains and mesas in north-central Utah, the Colorado Plateau and Great Basin of the western U.S. Stands occur on moderate slopes on all aspects. It is found on relatively warm southern aspects in the Wasatch Mountains, but also occurs on northern aspects at lower elevations and at more southern latitudes. Substrates are moderately deep, rocky loams and clays. The vegetation is characterized by a sparse to moderately dense tall-shrub layer (15-60% cover) dominated by the cold-deciduous shrub, *Amelanchier utahensis*. *Symphoricarpos oreophilus* often forms a short-shrub layer other shrub associates may include low cover of *Acer grandidentatum, Chrysothamnus viscidiflorus, Mahonia repens, Purshia tridentata*, and *Rosa woodsii*. *Quercus gambelii* may also be present, but it is always poorly represented (<5%). The sparse to moderately dense herbaceous layer is a mixture of perennial graminoids and forbs. Introduced species such as *Agropyron cristatum* and *Bromus tectorum* are common in disturbed stands.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: Elevation ranges between 6500-8000 feet for this association. Slopes are gentle or steep with various aspects. Soil texture is clayey or fine-grained on cinder cone formations, such as Firepit Knoll. The *Amelanchier utahensis* stands on the northern boundary of the park has rich loamy soils.

Global Environment: This montane shrubland association occurs in the foothills, mountains and mesas in north-central Utah, the Colorado Plateau and Great Basin of the western U.S. Elevation ranges from 1980-2440 m (6500-8000 feet). Stands occur on moderate slopes on all aspects. It is found on relatively warm southern aspects in the Wasatch Mountains (Yake and Brotherson 1979), but also occurs on northern aspects at lower elevations and more southern latitudes. Substrates are moderately deep, rocky loams and clays.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Amelanchier utahensis* dominates the shrub layer with 15-40% cover. Other shrubs are absent or insignificant in sampled plots. The high-elevation stand on the northern boundary of the park is more mesic, and shrubs are nearly 5 m in height. *Acer grandidentatum* is present as well as other mesic herbaceous species, such as *Mertensia arizonica* and *Poa pratensis*. This area is also subject to historical and current livestock grazing. The other documented sites have drier conditions. *Amelanchier utahensis* has a shorter stature and is more widely spaced. *Bromus tectorum* is abundant in the understory, and few other species are present. In observed locations in Cave Valley and Lee Valley, *Artemisia tridentata* is a component of this association.

Global Vegetation: This vegetation has a sparse to moderately dense (15-60% cover) tall-shrub layer dominated by *Amelanchier utahensis*. *Symphoricarpos oreophilus* often forms a short-shrub layer. Other shrubs may include *Acer grandidentatum, Chrysothamnus viscidiflorus, Mahonia repens, Purshia tridentata*, and *Rosa woodsii*. *Quercus gambelii* may also be present, but it is always poorly represented (<5% cover). The sparse to moderate herbaceous layer is a mixture of perennial graminoids and forbs. Herbaceous species include *Bromus carinatus, Koeleria macrantha, Achnatherum nelsonii ssp. dorei), Balsamorhiza sagittata, Chenopodium fremontii, Machaeranthera canescens*, and species of *Astragalus, Eriogonum, Mertensia*, and *Penstemon* (Yake and Brotherson 1979). Introduced species such as *Agropyron cristatum* and *Bromus tectorum* are common in disturbed stands.

Global Dynamics: Fire is important in maintaining the montane shrublands, as burning eliminates *Juniperus osteosperma* and *Pinus edulis* trees and other less fire-tolerant species. *Amelanchier utahensis* will sprout from the root crown after above-ground parts of the plant are killed by fire (Carmichael et al. 1978). It may be slightly harmed by fire, depending on moisture conditions, but is considered to be fire-tolerant and will persist or increase after burning (Carmichael et al. 1978, Crane 1982).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Amelanchier utahensis*

Global

Stratum	Species
TALL SHRUB	*Amelanchier utahensis*
SHORT SHRUB	*Symphoricarpos oreophilus*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Amelanchier utahensis, Artemisia tridentata*

Global

Stratum	Species
TALL SHRUB	*Amelanchier utahensis*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G4.

Global Comments: This association is not well known. More survey work and classification work are needed to further define this type.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs in two documented sites on the western side of Firepit Knoll and ridge north of Camp Creek and was observed in Cave Valley and Lee Valley.

Global Range: This shrubland association occurs in the foothills and mountain areas in north-central Utah, Colorado Plateau and Great Basin of the western U.S.

Nations: US
States/Provinces: NV UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH51, 65, 117. In Pine Springs Wash, there was a *Quercus turbinella* and *Amelanchier utahensis* mixture (not colluvial). AMUT was found in small stands in Lee Valley and Cave Valley. It was in a mosaic with *Artemisia tridentata*.
Classification Confidence: 2 **Identifier:** CEGL001067
REFERENCES: Bourgeron and Engelking 1994, Carmichael et al. 1978, Crane 1982, Driscoll et al. 1984, Eddleman and Jaindl 1994, Yake and Brotherson 1979

III.B.2.N.a.27. QUERCUS GAMBELII SHRUBLAND ALLIANCE

Gambel Oak Shrubland Alliance

QUERCUS GAMBELII - CERCOCARPUS MONTANUS / (CAREX GEYERI) SHRUBLAND

Gambel Oak - Mountain-mahogany / (Geyer's Sedge) Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This mixed montane shrubland association is reported from foothills, mountains and mesa tops in western Colorado and Utah. Stands occur on moderate to steep slopes. Aspect varies with elevation with low elevation stands restricted to more mesic northern and eastern aspects, and higher elevation stands occurring on southern and western aspects. Substrates are typically shallow and rocky, derived from sandstone and shale parent materials, and range from sandy- to clayey-textured soil. The vegetation is characterized by a moderately dense to dense thicket of tall deciduous shrubs 2-5 m tall (on unstable, eroding or talus slopes the shrub canopy may be open). Codominance of *Quercus gambelii* and *Cercocarpus montanus* (at least 10% cover of each) is diagnostic of this plant association, but *Amelanchier utahensis* is often also abundant to codominant. Low cover of other mixed shrub associates is common. *Arctostaphylos patula, Arctostaphylos pungens, Artemisia tridentata, Fendlera rupicola, Fraxinus anomala, Peraphyllum ramosissimum, Physocarpus monogynus, Purshia tridentata, Rhus trilobata, Rosa woodsii, Quercus turbinella, Symphoricarpos oreophilus*, and *Yucca* spp. may be present depending on geography. Occasional *Juniperus osteosperma* and *Pinus edulis* trees may be present also. The herbaceous layer is generally sparse because of dense overstory.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: Elevation ranges 5600-7200 feet for this association. Stands at lower elevations occur on northerly aspects. Slope gradient tends to be moderately steep to steep with northerly and easterly aspects. Stands may occur on mesa tops, but are generally indicative of mountain slopes in the northwest region of Zion National Park. Soil texture is clayey or loamy.

Global Environment: This mixed montane shrubland association is reported from foothills, mountains and mesa tops in western Colorado and Utah. Elevation ranges from 1700-2500 m (5600-8200 feet). Stands occur on moderate to steep slopes. Aspect varies with elevation with low elevation stands restricted to more mesic northern and eastern aspects, and higher elevation stands occurring on southern and western aspects. Substrates are typically shallow and rocky, derived from sandstone and shale parent materials, and range from sandy- to clayey-textured soil.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association depicts a true mixed montane shrubland. Total shrub cover is usually over 50%. Few pinyon and juniper trees exist in the stands or are often absent. *Cercocarpus montanus* is always present with cover from 10-50%. *Quercus turbinella* and *Amelanchier utahensis* are codominants or at least present in the stand. Other shrubs that may be present in this mountain shrub complex, but always contribute minimal cover, are *Symphoricarpos oreophilus, Arctostaphylos patula, Arctostaphylos pungens, Peraphyllum ramosissimum, Quercus turbinella, Fraxinus anomala*, and *Purshia tridentata*. Herbaceous species commonly present are *Poa fendleriana, Achnatherum hymenoides*, and *Vicia americana*.

Global Vegetation: This association is characterized by a moderately dense to dense thicket of tall deciduous shrubs 2-5 m tall (on unstable, eroding or talus slopes the shrub canopy may be open). Codominance of *Quercus gambelii* and *Cercocarpus montanus* (at least 10% cover of each) is diagnostic of this plant association, but *Amelanchier utahensis* is often also abundant to codominant. Low cover of other mixed shrub associates is common. *Arctostaphylos patula, Arctostaphylos pungens, Artemisia tridentata, Fendlera rupicola, Fraxinus anomala, Peraphyllum ramosissimum, Physocarpus monogynus, Purshia tridentata, Rhus trilobata, Rosa woodsii, Quercus turbinella, Symphoricarpos oreophilus*, and *Yucca* spp. may be present depending on geography. Occasional *Juniperus osteosperma* and *Pinus edulis* trees may be present also. The herbaceous layer is generally sparse because of dense overstory. It is typically composed of scattered graminoids such as *Carex geyeri, Poa fendleriana, Achnatherum hymenoides*, and forbs like *Vicia americana, Lupinus* spp., and *Lathyrus* spp.

Global Dynamics: Fire is important in maintaining the montane shrublands, as burning eliminates *Juniperus osteosperma* and *Pinus edulis* trees, but not the more fire-adapted shrub species. *Quercus gambelii* is a fire-adapted species with a well-developed root system used to draw moisture from a large volume of soil allowing for rapid resprouting after fire (Clary 1992). Muldavin et al. (1998b) reported that, in the Organ Mountains in southwestern New Mexico after a severe fire, *Quercus gambelii* resprouted into a dense thicket that excluded both herbaceous understory and conifer species. *Cercocarpus montanus* is also fire-adapted. Although its branches are usually killed by fire, it burns less readily than many other shrubs and sprouts vigorously from the root crown after most fires (Bradley et al. 1992, Pase and Lindenmuth 1971).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Amelanchier utahensis, Cercocarpus montanus, Quercus gambelii*

Global

Stratum	Species
TALL SHRUB	*Amelanchier utahensis, Cercocarpus montanus, Quercus gambelii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Juniperus scopulorum, Pinus edulis, Pinus monophylla*
TALL SHRUB	*Amelanchier utahensis, Arctostaphylos patula, Arctostaphylos pungens, Cercocarpus montanus, Peraphyllum ramosissimum, Quercus gambelii, Symphoricarpos oreophilus*
GRAMINOID	*Achnatherum hymenoides, Poa fendleriana*
FORB	*Vicia americana*

Global

Stratum	Species
TALL SHRUB	*Cercocarpus montanus, Quercus gambelii*
GRAMINOID	*Carex geyeri*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G3.

Global Comments: This plant association is similar to other montane Gambel oak shrublands except for the codominance of *Cercocarpus montanus* (10% cover or more). Other shrubs species may be present to codominant.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is abundant on the mountain slopes west of the Kolob Canyons. It has also been documented on the eastern side of the park in the Temple of Sinawava quadrangle.

Global Range: This montane shrubland association occurs in the foothills, mountains and mesa tops of western Colorado and Utah.

Nations: US
States/Provinces: CO UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH78, 79, 80, 111, 139, 201, 275
Classification Confidence: 2 **Identifier:** CEGL001113
REFERENCES: Baker 1982b, Bourgeron and Engelking 1994, Bradley et al. 1992, Clary 1992, Dillinger 1970, Driscoll et al. 1984, Ellis and Hackney 1981, Erdman 1962, Ferchau 1973, Hanson and Ball 1928, Keammerer and Peterson 1981, Muldavin et al. 1998b, Pase and Lindenmuth 1971, Schmoll 1935, Vories 1974

QUERCUS GAMBELII / AMELANCHIER UTAHENSIS SHRUBLAND

Gambel Oak / Utah Serviceberry Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This montane shrubland occurs in Utah and likely western Colorado. Stands occur on mesas, higher benches, ridges, foothills and mountains. Slopes are gentle to steep and aspects are easterly, southerly, and westerly. Soil are generally deep and well-developed. Vegetation is characterized by a sparse to moderately dense (20-70% cover) tall-shrub layer (2-5 m tall) that is dominated by *Quercus gambelii* with a short-shrub layer codominated by *Amelanchier utahensis* and *Artemisia tridentata*. *Cercocarpus montanus* is absent or poorly represented (<5% cover). Other shrubs and dwarf-shrubs present with low cover may include *Ephedra viridis, Gutierrezia sarothrae, Opuntia* spp., *Prunus virginiana*, and *Symphoricarpos* spp. Perennial graminoids such as *Pascopyrum smithii* or *Poa fendleriana* typically dominate the sparse herbaceous layer (<10% total cover). Common forbs may include *Achillea millefolium, Artemisia ludoviciana, Balsamorhiza sagittata, Phlox austromontana, Thalictrum fendleri*, or *Vicia americana*. Occasionally, tree species such as *Pinus edulis* or *Juniperus osteosperma* are present in the overstory.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on mountain slopes, ridges, and mesa tops at elevations of 5000-7500 feet. Slopes are gentle to steep and aspects are easterly, southerly, and westerly. Soil texture is variable.

Global Environment: This mountain shrubland occurs in Utah and likely western Colorado. Elevation ranges from 1525-2300 m (5000-7500 feet). Stands occur on mesas, higher benches, ridges, foothills and mountains Slopes are gentle to steep and aspects are easterly, southerly, and westerly. Soil are generally deep and well-developed.

VEGETATION DESCRIPTION

Zion National Park Vegetation: The tree layer is absent or minimal in this association. *Quercus gambelii* is the dominant shrub with cover over 10%. *Amelanchier utahensis* codominates or has less cover than *Quercus gambelii*. Other shrubs commonly present with minimal cover are *Symphoricarpos oreophilus, Cercocarpus montanus, Gutierrezia sarothrae*, and *Opuntia macrorhiza*. Total shrub cover ranges from 20-70%. The herbaceous layer is sparse, but commonly represented by *Poa fendleriana, Packera multilobata, Vicia americana*, and *Artemisia ludoviciana*.

Global Vegetation: This association is characterized by a sparse to moderately dense (20-70% cover) tall-shrub layer (2-5 m tall) that is dominated by *Quercus gambelii* with a short-shrub layer codominated by *Amelanchier utahensis* and *Artemisia tridentata*. *Cercocarpus montanus* is absent or poorly represented (<5% cover). Other shrubs and dwarf-shrubs present with low cover may include *Ephedra viridis, Gutierrezia sarothrae, Opuntia* spp., *Prunus virginiana*, and *Symphoricarpos* spp. Graminoids such as *Pascopyrum smithii* or *Poa fendleriana* dominate the sparse herbaceous layer (<10% total cover). Common forbs include *Achillea millefolium, Artemisia ludoviciana, Balsamorhiza sagittata, Packera multilobata, Phlox austromontana, Thalictrum fendleri*, or *Vicia americana*. Occasionally, tree species are present in the overstory including *Pinus edulis* or *Juniperus osteosperma*.

Global Dynamics: Fire is important in maintaining montane shrublands, as burning eliminates *Juniperus osteosperma* and *Pinus edulis* trees, but not the more fire-adapted shrub species. *Quercus gambelii* is a fire-adapted species with a well-developed root system used to draw moisture from a large volume of soil allowing for rapid resprouting after fire (Clary 1992). Muldavin et al. (1998b) reported that, in the Organ Mountains in southwestern New Mexico after a severe fire, *Quercus gambelii* resprouted into a dense thicket that excluded both herbaceous understory and conifer species. *Amelanchier utahensis* also sprouts from the root crown after above-ground parts of the plant are killed by fire (Carmichael et al. 1978). It may be slightly harmed by fire, depending on moisture conditions, but is considered to be fire-tolerant and will persist or increase after burning (Carmichael et al. 1978, Crane 1982).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Amelanchier utahensis, Quercus gambelii*

Global

Stratum	Species
TALL SHRUB	*Amelanchier utahensis, Quercus gambelii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Amelanchier utahensis, Quercus gambelii*
SHORT SHRUB	*Symphoricarpos oreophilus*
FORB	*Artemisia ludoviciana, Vicia americana*

Global

Stratum	Species
TALL SHRUB	*Amelanchier utahensis, Quercus gambelii*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G3G5.

Global Comments: This plant association is similar to other montane Gambel oak shrublands except for the codominance of *Amelanchier utahensis* with only minor amounts (<10% cover) of *Artemisia tridentata* or *Cercocarpus montanus*.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs abundantly scattered throughout the northwestern region of Zion National Park, on Kolob Arch, Guardian Angels and Springdale West quadrangles.

Global Range: This montane shrubland occurs in Utah and likely western Colorado.

Nations: US
States/Provinces: CO? UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH3, RH25, RH73, 19, 64, 73, 255, 360
Classification Confidence: 2 **Identifier:** CEGL001110
REFERENCES: Bourgeron and Engelking 1994, Carmichael et al. 1978, Cedar Creek Associates Inc. 1987, Clary 1992, Crane 1982, Driscoll et al. 1984, Muldavin et al. 1998b

QUERCUS GAMBELII / ARTEMISIA TRIDENTATA SHRUBLAND

Gambel Oak / Big Sagebrush Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This shrubland association is described from mountains and plateaus of Utah. Sites are on nearly level mesas to steep hillslopes (to 40%). Soils are gravelly loams. The vegetation is characterized by a moderately dense to dense tall-shrub layer (2-5 m tall) that is dominated by *Quercus gambelii* (10-60% cover) with a sparse to moderately dense short-shrub layer dominated by *Artemisia tridentata* often forming a mosaic of oak and sagebrush. If present, *Amelanchier* spp. and *Cercocarpus montanus* occur in minor amounts (<10% cover). Other shrubs that may be present include *Chrysothamnus viscidiflorus, Purshia tridentata, Opuntia* spp, *Rosa* spp., *Symphoricarpos* spp., and *Tetradymia canescens*. The relatively sparse herbaceous layer is a mixture of grasses and forbs.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at 6000-7000 feet, on flat to moderate sloping terrain, and on sandy soils.

Global Environment: This shrubland association has been described from mountains and plateaus of Utah. Elevation ranges from 1830-2135 m (6000-7000 feet). Sites are on nearly level mesas to steep hillslopes (to 40%). Soils are gravelly loams.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Quercus gambelii* dominates this association with cover of 10-40%. *Artemisia tridentata* is a significant component of the shrubland averaging 10% cover. Other shrub species inconsistently present with less cover are *Tetradymia canescens, Chrysothamnus* spp., *Purshia tridentata*, and *Opuntia* spp. Herbaceous species are of variable composition and minimal cover. Graminoids commonly present are *Poa fendleriana* and *Sporobolus cryptandrus*.

Global Vegetation: This association is characterized by a moderately dense to dense tall-shrub layer (2-5 m tall) that is dominated by *Quercus gambelii* (10-60% cover) with a sparse to moderately dense short-shrub layer dominated by *Artemisia tridentata* often forming a mosaic of oak and sagebrush. If present, *Amelanchier* spp. and *Cercocarpus montanus* occur in minor amounts (<10% cover). Other shrubs that may be present include *Chrysothamnus viscidiflorus, Purshia tridentata, Opuntia* spp, *Rosa* spp., *Symphoricarpos* spp., and *Tetradymia canescens*. The relatively sparse herbaceous layer is a mixture of grasses and forbs. Graminoids commonly present are *Carex rossii, Poa fendleriana , Pseudoroegneria spicata*, and *Sporobolus cryptandrus*. Common forbs include *Achillea millefolium, Artemisia ludoviciana, Thalictrum fendleri*, or *Vicia americana*.

Global Dynamics: Fire is important in maintaining the montane shrublands, as burning eliminates *Juniperus osteosperma* and *Pinus edulis* trees, but not the more fire-adapted shrub species. *Quercus gambelii* is a fire-adapted species with a well-developed root system used to draw moisture from a large volume of soil allowing for rapid resprouting after fire (Clary 1992). However, *Artemisia tridentata* shrubs are killed by burns and do not resprout (Wright et al. 1979). *Artemisia tridentata* will re-establish relatively quickly (about 10-20 years) if a seed source is nearby (Bunting 1987). If fire-return intervals are more frequent than 10 years, then *Artemisia tridentata* has difficulty recovering (Bunting 1987, Everett 1987). *Artemisia tridentata* may be able to persist in this community where an open shrub canopy and a sparse herbaceous layer limit fire movement and make it unlikely that it would burn except under extreme conditions.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Artemisia tridentata, Quercus gambelii*

Global

Stratum	Species
TALL SHRUB	*Artemisia tridentata, Quercus gambelii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Artemisia tridentata, Quercus gambelii*

Global

Stratum	Species
TALL SHRUB	*Artemisia tridentata, Quercus gambelii*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G4G5.

Global Comments: This plant association is similar to other montane Gambel oak shrublands except for the codominance of *Artemisia tridentata* with only minor amounts (<10% cover) of *Amelanchier utahensis* or *Cercocarpus montanus*.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs throughout Zion National Park, specifically on Kolob Canyons, Firepit Knoll, and Deer Trap Mountain.

Global Range: This shrubland association occurs in mountains and plateaus of Utah and possibly occurs in western Colorado.

Nations: US
States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH6, RH 72, 126
Classification Confidence: 2 **Identifier:** CEGL001111
REFERENCES: Blackhawk Coal Company 1981, Boucek 1986, Bourgeron and Engelking 1994, Bunting 1987, Christensen 1955, Clary 1992, Driscoll et al. 1984, Everett 1987, Wright et al. 1979

QUERCUS GAMBELII / POA FENDLERIANA SHRUBLAND [PROVISIONAL]

Gambel Oak / Muttongrass Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: Elevation ranges 5800-7600 feet for this association. Slopes are gentle to moderate and northeast-facing. Soil texture is sand and sandy loam.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Quercus gambelii* clearly dominates this association with foliar cover ranging from 20-90%. Other shrubs present have insignificant cover and inconsistent representation. *Symphoricarpos oreophilus*, if present, has less than 5% cover. The tree canopy layer is absent. The herbaceous layer is fairly significant with cover of 5-30%. *Poa fendleriana* is usually dominant and occurs consistently. Other graminoid species that may be present to abundant are *Bouteloua gracilis, Poa pratensis, Achnatherum hymenoides*, and *Hesperostipa comata*. Forb species present are inconsistent and of minimal cover.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Quercus gambelii*
GRAMINOID	*Bouteloua gracilis, Poa fendleriana*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Quercus gambelii*
GRAMINOID	*Poa fendleriana*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is mostly found in the northern latitudes of the park at high elevations and some north-facing slopes of lower elevations.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH91, 76, 268, 350
Classification Confidence: **Identifier:** CEGL002949
REFERENCES: None available.

QUERCUS GAMBELII / SYMPHORICARPOS OREOPHILUS SHRUBLAND
Gambel Oak / Mountain Snowberry Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This plant association is found in the foothills, plateaus and mountains from western Texas to southern and western Colorado and northern Utah, and likely occurs in northern Arizona. It is a mesic upland and a non-obligate riparian community that appears to be transitional between riparian areas and drier upland communities such as *Artemisia* spp. It occurs on cool, moist sites, such as along drainages in canyons and steep draws in more xeric areas, and as a mesic upland shrubland forming extensive stands on cooler northern slopes. Substrates are typically deep, well-drained sandy loam to clay loam derived from alluvium or colluvium. The vegetation is characterized by an open to closed, typically tall-shrub layer (2-5 m tall) that is dominated by *Quercus gambelii*. The understory is composed of a short-shrub layer that is dominated by *Symphoricarpos oreophilus* or a closely related local *Symphoricarpos* species such as *Symphoricarpos rotundifolius* or *Symphoricarpos palmeri*. Other mesic shrubs may be present including *Amelanchier* spp., *Prunus virginiana, Robinia neomexicana*, and *Brickellia* sp. In some stands, the *Quercus gambelii* develop into small trees that form a tree canopy. These "woodlands" are included in this association because their floristic composition is identical to the tall shrublands. In other stands the oak is mostly under 2 m tall, forming a short-shrub layer. The herbaceous layer is sparse to moderately dense, depending on density of woody canopy, and is often dominated by graminoids such as species of *Achnatherum, Bromus, Elymus, Poa*, and *Koeleria*. Common forbs include *Vicia americana, Thalictrum fendleri*, and *Achillea millefolium*. Occasionally, tree species are present in the overstory.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on high slopes, ridges, and mesas, with elevations ranging from 6500-7800 feet, various aspects, and gentle to moderate gradients. Soil texture is most commonly clay loam.

Global Environment: This plant association is found in the foothills, plateaus and mountains from western Texas to southern and western Colorado and northern Utah, and likely occurs in northern Arizona. Elevation ranges from 1830-2625 m (6000-8600 feet). It is a mesic upland and a non-obligate riparian community that appears to be transitional between riparian areas and drier upland communities such as *Artemisia* spp. It occurs on cool, moist sites, such as along drainages in canyons and steep draws in more xeric areas, and as a mesic upland shrubland forming extensive stands on cooler northern slopes. Substrates are typically deep, well-drained sandy loam to clay loam derived from alluvium or colluvium.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Quercus gambelii* is dominant in this association either in tree, tall-shrub, or short-shrub form with cover of 10-60%. *Symphoricarpos oreophilus* is in the understory with cover of 5-20%. On the east side of the park, shrubs that may be present to well-represented are *Purshia tridentata* and *Peraphyllum ramosissimum*. Graminoids are often abundant in the understory, and the stand may appear as a wooded grassland. Some graminoid species that occur are *Hesperostipa comata, Poa pratensis, Poa fendleriana, Achnatherum lettermanii, Bouteloua gracilis, Bromus inermis, Elymus repens, Achnatherum hymenoides*, and *Elymus elymoides*. *Vicia americana* is commonly present. Surrounding vegetation is commonly grassland meadows and shrublands.

Global Vegetation: The vegetation is characterized by an open to closed, tall-shrub layer (2-5 m tall) that is dominated by *Quercus gambelii*. The understory is composed of a short-shrub layer that is dominated by *Symphoricarpos oreophilus* or a closely related local *Symphoricarpos* species such as *Symphoricarpos rotundifolius* or *Symphoricarpos palmeri*. Other mesic shrubs may be present including *Amelanchier* spp., *Prunus virginiana, Robinia neomexicana*, and *Brickellia* sp. In some stands, the *Quercus gambelii* develop into small trees that form a tree canopy. These "woodlands" are included in this association because their floristic composition is identical to the tall shrublands. In other stands the oak is mostly under 2 m tall forming a short shrub layer. The herbaceous layer is sparse to moderately dense, depending on density of woody canopy, and is often dominated by graminoids such as species of *Achnatherum, Bromus, Elymus, Poa*, and *Koeleria macrantha*. Common forbs include *Vicia americana, Thalictrum fendleri*, and *Achillea millefolium*. Occasionally, tree species are present in the overstory including *Pinus ponderosa, Juniperus scopulorum*, and *Pseudotsuga menziesii*. Introduced graminoids such as *Bromus inermis* and *Poa pratensis* are often common in stands that have been disturbed by heavy livestock grazing.

Global Dynamics: Fire is important in maintaining montane shrublands, as burning eliminates *Juniperus osteosperma, Juniperus scopulorum*, and *Pinus edulis* trees, but not the more fire-adapted shrub species. *Quercus gambelii* is a fire-adapted species with well-developed root systems that draw moisture from a large volume of soil allowing for rapid resprouting after fire (Clary 1992). Muldavin et al. (1998b) reported that, in the Organ Mountains in southwestern New Mexico after a severe fire, *Quercus gambelii* resprouted into a dense thicket that excluded both herbaceous understory and conifer species. *Symphoricarpos oreophilus* is tolerant of fire, is usually undamaged by low-severity fire, and will sprout if the above-ground parts are burned. It is considered a weak sprouter and may take longer to recover from a burn than *Quercus gambelii* (up to 15 years after a severe fire) (Crane 1982, Wright et al. 1979).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Quercus gambelii, Symphoricarpos oreophilus*
GRAMINOID	*Achnatherum lettermanii, Hesperostipa comata, Poa pratensis*

Global

Stratum	Species
TALL SHRUB	*Quercus gambelii, Symphoricarpos oreophilus*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Quercus gambelii, Symphoricarpos oreophilus*

Global

Stratum	Species
TALL SHRUB	*Quercus gambelii, Symphoricarpos oreophilus*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: This plant association is similar to other montane Gambel oak shrublands except for the codominance of *Symphoricarpos oreophilus* with only minor amounts (<10% cover) of *Amelanchier utahensis, Artemisia tridentata*, or *Cercocarpus montanus*.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs at high-elevation sites in Kolob Arch, Guardian Angels, and Temple of Sinawava quadrangles.

Global Range: This shrubland association is reported from foothills, plateaus and mountains of western Texas to southern and western Colorado and Utah, and likely occurs in Arizona.

Nations: US
States/Provinces: AZ? CO NM TX UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH05, RH50, 86, 91, 94, 103, 122, 133, 256, 84
Classification Confidence: 2 **Identifier:** CEGL001117
REFERENCES: Baker 1982b, Bourgeron and Engelking 1994, Clary 1992, Crane 1982, Driscoll et al. 1984, Erdman 1962, Hess and Wasser 1982, Hoffman and Alexander 1980, Johnston 1987, Kittel et al. 1994, Kittel et al. 1999, Kittel et al. 1999b, Komarkova et al. 1988a, Muldavin 1994, Muldavin and Mehlhop 1992, Muldavin et al. 1994a, Muldavin et al. 1998b, Muldavin et al. 2000b, Soil Conservation Service 1978, Wright et al. 1979

III.B.2.N.a.200. SYMPHORICARPOS OREOPHILUS SHRUBLAND ALLIANCE
Mountain Snowberry Shrubland Alliance

SYMPHORICARPOS OREOPHILUS / POA PRATENSIS SEMI-NATURAL SHRUBLAND [PROVISIONAL]

Mountain Snowberry / Kentucky Bluegrass Semi-natural Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs in depressions or gentle drainages of the undulating plateau at 7800 feet. Soil texture is clay loam. Low-intensity prescribed fire in the spring of 1999 impacted this area.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Symphoricarpos oreophilus* is widespread in Oak Valley and Lower Kolob Plateau as an understory species. Here, it is the dominant species in the short-shrub layer with 30% cover. Charred stems of *Artemisia nova* are abundant at the site due to the recent prescribed fire. No live *Artemisia nova* shrubs are present in the plot sampled, but they are present in unburned areas nearby. Total herbaceous cover is 30%. *Poa pratensis* dominates with 20% cover. Other graminoids present are *Pascopyrum smithii, Elymus repens*, and *Achnatherum lettermanii*. Forbs present include *Lathyrus brachycalyx, Lupinus argenteus, Artemisia campestris, Mentha X piperita, Penstemon* spp., *Mertensia arizonica, Eriogonum racemosum, Tragopogon dubius*, and *Achillea millefolium*.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Symphoricarpos oreophilus*
GRAMINOID	*Poa pratensis*
FORB	*Lathyrus brachycalyx*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Symphoricarpos oreophilus*
GRAMINOID	*Pascopyrum smithii, Poa pratensis*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled in Oak Spring Valley in the Guardian Angels quadrangle of Zion National Park and has been observed scattered infrequently across the Lower Kolob Plateau.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 90
Classification Confidence: 3 **Identifier:** CEGL002951
REFERENCES: None available.

III.B.2.N.d. Temporarily flooded cold-deciduous shrubland

III.B.2.N.d.26. BETULA OCCIDENTALIS TEMPORARILY FLOODED SHRUBLAND ALLIANCE

Water Birch Temporarily Flooded Shrubland Alliance

POPULUS FREMONTII / BETULA OCCIDENTALIS WOODED SHRUBLAND

Fremont Cottonwood / Water Birch Wooded Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This riparian shrubland association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: Elevation for this association is 5500 to 6000 feet, but it does occur at lower elevations if the site is shaded and north-facing. It occurs on flat to gentle sloping streambanks and benches on sandy loam soils.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Vegetation structure and cover in this association are variable. *Populus fremontii* may be present as young trees contributing to the tall-shrub layer, codominated by riparian shrubs *Betula occidentalis* and *Salix* spp. In some cases, *Populus fremontii* or *Juniperus scopulorum* may occur as mature trees with a canopy cover of 5-20%. *Betula occidentalis* dominates the shrub layer (10-40% cover) accompanied by various shrubs of inconsistent frequency depending on the adjacent upland vegetation. Most frequently occurring or characteristic shrubs of this association are *Salix* spp. and *Rosa woodsii*. The herbaceous layer has variable composition, with average cover of 30% and relatively tall structure. This may not be true where recreational trails intersect streambanks and the vegetation is trampled. Common herbaceous species include *Agrostis stolonifera, Poa pratensis,* and *Maianthemum stellatum.*

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Populus angustifolia, Populus fremontii*
SHRUB	*Betula occidentalis, Rosa woodsii*
GRAMINOID	*Agrostis stolonifera, Poa pratensis*
FORB	*Maianthemum stellatum*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Populus fremontii*
SHRUB	*Betula occidentalis*

Global

Stratum	Species
Information not available.	

OTHER NOTEWORTHY SPECIES

Zion National Park
Salix spp. are also dominant shrubs and *Equisetum* spp. are also dominant forbs.

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs in mid-elevation, cool drainages of the Kolob Canyons, specifically Taylor Creek and its tributaries. It has also been documented in Left Fork of North Creek and Shune's Creek.

Global Range: This riparian association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 23, 38, 69, 524
Classification Confidence: 3 **Identifier:** CEGL002981
REFERENCES: None available.

III.B.2.N.d.6. SALIX (EXIGUA, INTERIOR) TEMPORARILY FLOODED SHRUBLAND ALLIANCE

(Coyote Willow, Sandbar Willow) Temporarily Flooded Shrubland Alliance

SALIX EXIGUA / BARREN SHRUBLAND

Coyote Willow / Barren Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This riparian shrubland is common in the Rocky Mountains, Colorado Plateau and Great Basin. It is composed of nearly pure stands of *Salix exigua*, with few other species. Exposed gravel, cobbles or sand characterize the ground cover, but an undergrowth of a few, scattered forbs and grasses is usually present. This association occurs within the annual flood zone of rivers on point bars, islands, sand or cobble bars, and streambanks.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: *Salix exigua* / Barren Shrublands occur on deep alluvial sands of washes and sandbars at elevations from 4000 to 7000 feet.

Global Environment: This riparian shrubland is common in the Rocky Mountains, Colorado Plateau and Great Basin. Elevation ranges from 780-2600 m. This association occurs within the annual flood zone of rivers on point bars, islands, sand or cobble bars, and on streambanks occurring along a wide variety of stream reaches, from moderately sinuous and moderate-gradient reaches. It can form large, wide stands on mid-channel islands in larger rivers or narrow stringer bands on small, rocky tributaries. Substrates are typically coarse alluvial deposits of sand, silt and cobbles that are highly stratified vertically from flooding scour and deposition, often consisting of alternating layers of finer textured soil with organic material over coarser alluvium. Occasionally, this association occurs on deep pockets of sand. The lack of soil development and high ground cover of coarse alluvial material are key indicators for this association.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Salix exigua* dominates this association though its foliar cover is sparse, 10-30%. The herbaceous vegetation layer cover is 10%. These riparian sites usually are subject to human disturbance and readily invaded by exotic grasses and forbs. *Populus fremontii* seedlings are also abundant in this vegetation, suggesting succession will occur to a *Populus fremontii* forest or woodland.

Global Vegetation: This riparian association is characterized by a sparse to dense, tall-shrub (1.5-3 m) canopy composed of *Salix exigua* with ground cover of exposed gravel, cobbles or sand. Relatively low cover of several other shrubs and trees may be present including *Alnus incana, Salix monticola, Salix ligulifolia (= Salix eriocephala var. ligulifolia), Salix irrorata, Salix lucida, Acer negundo, Abies lasiocarpa, Populus angustifolia, Populus deltoides*, and *Populus fremontii*. A sparse herbaceous layer may be present among the bare soil, gravel, cobbles, or boulders consisting of a wide variety of forbs and graminoids. *Mentha arvensis*, and species of *Carex, Eleocharis, Juncus, Schoenoplectus*, and *Equisetum* are often present. Introduced species, such as *Elaeagnus angustifolia, Tamarix* spp., *Bromus tectorum, Bromus inermis, Elymus repens (= Elytrigia repens), Poa pratensis, Agrostis stolonifera* (and other exotic forage species), *Taraxacum officinale, Conyza canadensis*, and *Lepidium latifolium*, have been reported from some stands.

Global Dynamics: This association is an early-seral type that colonizes newly created point bars and other recent alluvial deposits formed in rivers and streams (Kittel et al. 1999b).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Salix exigua*
GRAMINOID	*Agrostis stolonifera, Bromus tectorum, Juncus longistylis*
FORB	*Artemisia campestris, Rumex acetosella, Senecio spartioides*

Global

Stratum	Species
TALL SHRUB	*Salix exigua*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Salix exigua*

Global

Stratum	Species
TALL SHRUB	*Salix exigua*

GLOBAL SIMILAR ASSOCIATIONS:

- Salix exigua / Mesic Graminoids Shrubland (CEGL001203)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: In the western Great Plains this association includes stands composed of intermediates between *Salix interior (= Salix exigua ssp. interior)* and *Salix exigua (= Salix exigua ssp. exigua)* (Dorn 1997, G. Kittel pers. comm. 2001). Until recently these taxa where combined at the species level (Kartesz 1999). More information on the distribution of introgression between *Salix interior (= Salix exigua ssp. interior)* and *Salix exigua (= Salix exigua ssp. exigua)* is needed to fully understand the ranges of these two species.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is documented in Hop Valley and Lee Valley in Zion National Park. It likely occurs in other similar washes or river sandbars throughout the park.

Global Range: This riparian shrubland association is common at lower to middle elevations in the Great Basin, Colorado Plateau and Rocky Mountains extending out into the western Great Plains along major rivers.

Nations: US
States/Provinces: CO ID? UT WA

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 74
Classification Confidence: 1 **Identifier:** CEGL001200
REFERENCES: Bourgeron and Engelking 1994, Christy 1973, Dorn 1997, Driscoll et al. 1984, Hall and Hansen 1997, Hansen et al. 1995, Johnston 1987, Jones and Walford 1995, Kittel and Lederer 1993, Kittel et al. 1994, Kittel et al. 1995, Kittel et al. 1996, Kittel et al. 1999, Kittel et al. 1999b, Muldavin et al. 2000a, Padgett et al. 1988b, Padgett et al. 1989, Tuhy and Jensen 1982

SALIX EXIGUA / MESIC GRAMINOIDS SHRUBLAND

Coyote Willow / Mesic Graminoids Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This riparian association is found primarily in the central Great Plains, but also occurs in parts of the Rocky Mountains and Intermountain semi-desert regions. It generally occurs along backwater channels and other perennially wet, but less scoured sites such as floodplain swales and irrigation ditches. In Nebraska, this community is found on sandbars, islands, and shorelines of stream channels and braided rivers. The vegetation is characterized by the dominance of *Salix exigua* in a moderately dense tall-shrub canopy with a dense herbaceous layer dominated by graminoids. Other common shrubs include saplings of *Populus deltoides* or *Salix amygdaloides, Salix eriocephala, Salix lutea*, and *Amorpha fruticosa*. Tall perennial grasses can appear to codominate the stand when *Spartina pectinata, Panicum virgatum* or other tall grasses are present. Other mesic graminoids, such as *Carex* spp., *Eleocharis* spp., *Juncus* spp., *Pascopyrum smithii, Schoenoplectus pungens (= Scirpus pungens)*, and *Sphenopholis obtusata*, may be present. Common forb species include *Bidens* spp., *Lobelia siphilitica, Lycopus americanus, Lythrum alatum, Polygonum* spp., and *Xanthium strumarium*. Diagnostic features include nearly pure stands of *Salix exigua* shrubs, with a dense herbaceous layer of at least 30% cover of mesic graminoids.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: This association occurs infrequently on sandy creek bottoms that are seasonally flooded. Stream gradient is flat to gentle and soils are deep sands.

Global Environment: This riparian association is found primarily in the central Great Plains, but also occurs in parts of the Rocky Mountains and Intermountain semi-desert regions. Elevation ranges from 1750-2700 m (5700-9100 feet). It generally occurs along alluvial terraces of backwater channels and other perennially wet, but less scoured sites such as floodplain swales and irrigation ditches. This community is found on sandbars, islands, and shorelines of stream channels and braided rivers in Nebraska (Steinauer and Rolfsmeier 2000). Stands usually occur within 1 m vertical distance of the stream channel on point bars, low floodplains, terraces and along overflow channels. It can also occur away from the stream channel in mesic swales or along the margins of beaver ponds and seeps. Soils are derived from alluvium and are quite variable in development, ranging from thin (<1 m) and skeletal with depth (10-50% cobbles) to well-developed Mollisols (Kittel et al. 1999). Textures are typically loamy sands interspersed with layers of silty clays and alternating with coarse sands. Upper layers (10-30 cm) often have 25-30% organic matter (Kittel et al. 1999).

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association is dominated by *Salix exigua* and a diverse array of mesic graminoids in sandy bottoms of intermittent streams. *Salix exigua* may be present to abundant. Graminoids dominate the understory on the rocky sand substrate and include *Juncus longistylis, Juncus tenuis, Juncus torreyi, Luzula parviflora, Schoenoplectus americanus, Typha angustifolia, Sorghastrum nutans, Elymus canadensis, Pascopyrum smithii*, and *Agrostis stolonifera*.

Global Vegetation: This association is characterized by the dominance of *Salix exigua* in a moderately dense, tall-shrub canopy with a dense herbaceous layer dominated by mesic graminoids. Others common shrubs may include saplings of *Populus deltoides, Salix amygdaloides, Salix bebbiana, Salix eriocephala, Salix geyeriana, Salix lucida ssp. lasiandra (= Salix lasiandra), Salix lutea, Salix monticola, Salix planifolia, Amorpha fruticosa*, or *Rosa woodsii*. Tall perennial grasses can appear to codominate the stand when *Spartina pectinata, Sorghastrum nutans, Panicum virgatum*, or other tall grasses are present. Mesic graminoids dominate the diverse understory and include *Carex pellita (= Carex lanuginosa), Carex nebrascensis, Carex rostrata, Deschampsia caespitosa, Eleocharis palustris, Elymus canadensis, Equisetum* spp., *Glyceria* spp., *Juncus balticus, Juncus longistylis, Juncus tenuis, Juncus torreyi, Luzula parviflora, Pascopyrum smithii, Schoenoplectus americanus, Schoenoplectus pungens (= Scirpus pungens), Sphenopholis obtusata*, and others. The sparse forb cover may include *Lobelia siphilitica, Bidens* spp., *Geum macrophyllum, Lycopus americanus, Lythrum alatum, Mentha arvensis, Polygonum* spp., *Typha angustifolia, Veronica americana*, and *Xanthium strumarium*. *Agrostis stolonifera, Bromus inermis, Melilotus* spp., *Poa pratensis*, *Phleum pratense*, and other introduced forage species may be present to abundant in disturbed stands of this community. Diagnostic features of this association include the nearly pure stands of *Salix exigua* shrubs, with a dense herbaceous layer of at least 30% cover of mesic graminoids.

Global Dynamics: Flooding and scouring during spring periods is common. This plant association is considered early-seral typical of recent floodplains and highly disturbed, low, wet areas . The presence of *Populus* sp. seedlings within this association indicates succession to a cottonwood stand. Overgrazing by livestock will reduce the vigor of *Salix exigua* and may eventually eliminate it from the site allowing invasion of introduced and non-palatable native species. However, reducing stocking rate will allow *Salix exigua* to re-establish itself, provided it has not been completely eliminated from the site. (Hansen et al. 1995).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Salix exigua*
GRAMINOID	*Schoenoplectus americanus, Sorghastrum nutans, Spartina pectinata*

Global

Stratum	Species
TALL SHRUB	*Salix exigua*
GRAMINOID	*Pascopyrum smithii, Poa pratensis, Schoenoplectus americanus, Sorghastrum nutans*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Salix exigua*
GRAMINOID	*Juncus* spp.*, Schoenoplectus* spp.

Global

Stratum	Species
TALL SHRUB	*Salix exigua*
GRAMINOID	*Carex nebrascensis, Elymus canadensis, Juncus balticus, Schoenoplectus americanus, Sorghastrum nutans*

GLOBAL SIMILAR ASSOCIATIONS:

- Riverine Sand Flats - Bars Sparse Vegetation (CEGL002049)
- Salix exigua Temporarily Flooded Shrubland (CEGL001197)
- Salix exigua / Barren Shrubland (CEGL001200)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: This broadly defined plant association occupies a rather large range and currently includes *Salix exigua* shrublands with herbaceous layers dominated by the introduced mesic, perennial, sod-grass *Poa pratensis*. Classification review of descriptions from the western part of its range need further review to determine if the type should be split. In addition, western stands may all belong to *Salix exigua sensu stricto*, and Great Plains stands may belong to either *Salix exigua* or *Salix interior* (or intermediates). *Salix interior* is an entirely Great Plains and eastward species (Kartesz 1999). In Nebraska, this community intergrades and is a successional stage that appears after both Riverine Sand Flats - Bars Sparse Vegetation (CEGL002049) and *Salix exigua* Temporarily Flooded Shrubland (CEGL001197), which is more frequently disturbed and lacks many of the more mesic herbaceous species.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is documented at sites along Pine Creek and the Right Fork of North Creek. It also has been observed along several small creeks of the western side of Zion National Park.

Global Range: This association is found primarily in the central Great Plains, but also parts of the Rocky Mountains and Intermountain Semi-desert regions, ranging from Wyoming west to possibly Idaho, south to Utah, and east to Oklahoma.

Nations: US
States/Provinces: CO ID? KS NE OK UT WY

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 66, 143
Classification Confidence: 1 **Identifier:** CEGL001203
REFERENCES: Bourgeron and Engelking 1994, Cooper and Cottrell 1990, Driscoll et al. 1984, Hansen et al. 1995, Hoagland 1998c, Hoagland 2000, Jones and Walford 1995, Kittel 1994, Kittel and Lederer 1993, Kittel et al. 1996, Kittel et al. 1999, Lauver et al. 1999, Padgett et al. 1988b, Padgett et al. 1989, Steinauer and Rolfsmeier 2000, Walford et al. 2001

III.B.2.N.d.37. SALIX LIGULIFOLIA TEMPORARILY FLOODED SHRUBLAND ALLIANCE

Strapleaf Willow Temporarily Flooded Shrubland Alliance

SALIX LIGULIFOLIA / CAREX UTRICULATA SHRUBLAND [PROVISIONAL]

Strapleaf Willow / Beaked Sedge Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: This stand occurs above 7500 feet. The meadow is positioned in a gently sloping basin with a northern aspect. Soils are moist clay loam with 100% herbaceous vegetation litter cover. Small stream channels meander through the meadow.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Salix ligulifolia* is the only shrub occurring in this willow carr with over 50% cover. Diverse herbaceous vegetation composes a lush, dense herbaceous vegetation layer and surrounding meadow. Some herbaceous species present are *Carex rostrata* (30% cover), *Poa pratensis* (10%), *Agrostis stolonifera, Phleum pratense, Carex microptera, Maianthemum stellatum* (20%), *Mentha arvensis*, and *Mertensia arizonica*.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Salix ligulifolia*
GRAMINOID	*Carex utriculata, Poa pratensis*
FORB	*Maianthemum stellatum*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Salix ligulifolia*
GRAMINOID	*Carex utriculata*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was documented on Horse Ranch Mountain of Zion National Park. *Salix ligulifolia* occurs naturally at higher elevations. Consequently, this association is not likely to be found elsewhere in the park.

Global Range: This association has currently only been described from Zion NP in southwestern Utah, but may occur elsewhere on the Markagunt Plateau.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 121
Classification Confidence: 3 **Identifier:** CEGL002975
REFERENCES: None available.

III.B.3.N.a. Extremely xeromorphic deciduous subdesert shrubland without succulents

III.B.3.N.a.4. PROSOPIS GLANDULOSA SHRUBLAND ALLIANCE

Honey Mesquite Shrubland Alliance

[NO ASSOCIATION]

ALLIANCE CONCEPT

GLOBAL SUMMARY: This alliance includes shrublands dominated by *Prosopis glandulosa*. Shrublands in this alliance can cover extensive areas, invading open grasslands and often forming thickets. The shrublands extend up to 4500 feet elevation. Associated species can include *Atriplex canescens, Bouteloua curtipendula, Bouteloua gracilis, Muhlenbergia porteri, Sporobolus airoides, Sporobolus flexuosus*, and *Buchloe dactyloides*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This alliance was not sampled at Zion NP, but occurred in the environs and was mapped. Sampling is needed to determine association level environmental information.

Global Environment: Shrublands included in this alliance occur from southwestern Oklahoma to the coast of southern Texas, and west to southern Nevada. Elevation ranges from 1-1600 m. Climate is arid to semi-arid, with hot summers and freezing temperatures not uncommon during the winter. Precipitation varies with geography. At the Jornada Experimental Range in southwestern New Mexico, annual precipitation ranged from 7-45 cm with mean annual precipitation of about 23 cm (Herbel et al. 1972). The precipitation has a bimodal distribution with about two-thirds of the precipitation falling during July to October and a third falling during the winter months. Farther west the proportion of summer precipitation decreases and winter precipitation dominates (Barbour and Major 1977). Sites include sandy plains, gypsum hills, coppice dunes, terraces along intermittent drainages, and moderately saline soils just above tidal flats. They are generally flat or gently sloping, and this vegetation occurs on all aspects. Substrate is usually sandy or gravelly alluvium, but may be composed of eolian sands and deltaic clays. Parent materials include andesite and rhyolite. Soils are generally coarse-textured, but may include gravelly clay loams. Some sites are moderately saline. These shrublands may grade into grasslands dominated by *Bouteloua gracilis, Sporobolus airoides, Pleuraphis mutica (= Hilaria mutica)* or may be surrounded by a matrix of desertscrub dominated by *Larrea tridentata* or *Ambrosia* spp.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This alliance was not sampled at Zion NP, but occurred in the environs and was mapped. Sampling is needed to determine association level vegetation information.

Global Vegetation: Shrublands included in this alliance cover extensive areas of sandy plains and valleys, gypsum hills and dunes from southwestern Oklahoma to the coast of south Texas and across southern New Mexico and southeastern Arizona, invading open grasslands and often forming thickets. In western Arizona and other dry portions of its range, the vegetation occurs as arroyo riparian and dune vegetation types. Stands have moderate to dense cover dominated by the xeromorphic deciduous shrub *Prosopis glandulosa*. The diversity of other species can vary greatly with geography and substrate, with dune communities the most depauperate and riparian arroyos the most diverse. Other characteristic shrubs include *Acacia greggii, Artemisia filifolia, Atriplex canescens, Chilopsis linearis, Ericameria laricifolia, Gutierrezia sarothrae, Krascheninnikovia lanata, Larrea tridentata, Lycium berlandieri*, and *Ziziphus obtusifolia*. Succulents may include *Opuntia acanthocarpa, Opuntia leptocaulis, Opuntia imbricata, Opuntia phaeacantha, Yucca baccata, Yucca elata*, and *Yucca glauca*. Depending on geography, substrate and land-use history, the graminoid layer can be moderately dense to insignificant. Characteristic perennial grasses include *Aristida* spp., *Bouteloua curtipendula, Bouteloua eriopoda, Bouteloua gracilis, Buchloe dactyloides, Pleuraphis jamesii (= Hilaria jamesii), Pleuraphis mutica (= Hilaria mutica), Muhlenbergia porteri, Sporobolus flexuosus*, and *Sporobolus wrightii*. Sparse annual grasses such as *Aristida adscensionis, Bouteloua barbata*, and *Dasyochloa pulchella (= Erioneuron pulchellum)* may be present. Forb cover is also sparse, but it can be relatively

diverse. Common forbs include species of *Chenopodium, Croton, Eriogonum, Euphorbia, Solanum*, and *Zinnia*. In more saline areas, shrubs are sparser and grasses and forbs are more common and may include *Spartina spartinae, Borrichia frutescens, Sporobolus airoides, Distichlis spicata*, and *Sesuvium verrucosum*. Bourgeron et al. (1993b) described several stands at the Gray Ranch with canopy cover for *Prosopis glandulosa* and perennial grasses (dominated by *Bouteloua* spp.) ranging from 10-30% and 3-55%, respectively..

Global Dynamics: Shrublands dominated by *Prosopis glandulosa* have replaced large areas of desert grasslands, especially those formerly dominated by *Bouteloua eriopoda*, in Trans-Pecos Texas, southern New Mexico and southeastern Arizona (Hennessy et al. 1983, York and Dick-Peddie 1969). Studies on the Jornada Experimental Range suggest that combinations of drought, overgrazing by livestock, wind and water erosion, seed dispersal by livestock, fire suppression, shifting dunes, and changes in the seasonal distribution of precipitation have caused this recent, dramatic shift in vegetation physiognomy (Buffington and Herbel 1965, Gibbens et al. 1983, Herbel et al. 1972, Hennessy et al. 1983, Humphrey 1974, McLaughlin and Bowers 1982, McPherson 1995, Schlesinger et al. 1990).

Prosopis spp. have extensive root systems that allow them to exploit deep soil water that is unavailable to shallower rooted grasses and cacti (Burgess 1995). This strategy works well, except on sites that have well-developed argillic or calcic soil horizons that limit infiltration and storage of winter moisture in the deeper soil layers (McAuliffe 1995). McAuliffe (1995) found *Prosopis* spp. invasion on these sites to be limited to a few, small individuals. This has implications in plant geography and grassland revegetation work in the southwestern United States..

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Prosopis glandulosa*

Global

Stratum	Species
TALL SHRUB	*Prosopis glandulosa*
SHORT SHRUB	*Acacia greggii, Artemisia filifolia, Atriplex canescens, Chilopsis linearis, Ericameria laricifolia, Gutierrezia sarothrae, Krascheninnikovia lanata, Larrea tridentata, Lycium berlandieri*, and *Ziziphus obtusifolia*
GRAMINOID	*Spartina spartinae, Sporobolus airoides, Distichlis spicata*,

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TALL SHRUB	*Prosopis glandulosa*

Global

Stratum	Species
TREE CANOPY	*Prosopis glandulosa*

OTHER NOTEWORTHY SPECIES

Global

Stratum	Species
GRAMINOID	*Bromus rigidus, Bromus tectorum*

GLOBAL SIMILAR ALLIANCES:

- PROSOPIS GLANDULOSA WOODLAND ALLIANCE (A.611)
- PROSOPIS GLANDULOSA TEMPORARILY FLOODED WOODLAND ALLIANCE (A.637)
- PROSOPIS (GLANDULOSA, VELUTINA) WOODLAND ALLIANCE (A.661)
- PROSOPIS GLANDULOSA SHRUB HERBACEOUS ALLIANCE (A.1550)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: Not Applied to alliances.

Global Comments: Although stand structure is different, all the similar alliances include stands that are dominated or codominated by *Prosopis glandulosa*. Some arroyo riparian stands in Arizona are similar to stands in the *Baccharis sarothroides, Acacia greggii*, and *Parkinsonia* spp.-dominated alliances.

Classification of *Prosopis glandulosa*-dominated stands needs clarification. Because *Prosopis glandulosa* can have both shrub and tree growth forms, there may be confusion classifying a given stand. For example, what characteristic separates a *Prosopis* arroyo riparian woodland from a shrubland? Currently, mesquite coppice dunes, which may be better classified in a sparsely vegetated alliance, are included in this alliance. Also, the formation in which this alliance is classified does not allow succulents. However, many stands in this alliance have a fairly consistent presence of succulents, usually species of *Opuntia* and *Yucca*.

ELEMENT DISTRIBUTION

Zion National Park Range: This alliance was not sampled at Zion NP, but occurred in the environs and was mapped. It likely occurs in lowlands and disturbed riparian forest in canyon.

Global Range: Shrublands included in this alliance are found in southwestern Oklahoma, western and southern Texas, west across the Chihuahuan and Sonoran deserts and into southern Nevada. The alliance likely occurs in adjacent northern Mexico.

Nations: MX US
States/Provinces: AZ MXNU MXTM NM NV OK UT TX

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: None
Classification Confidence: 2 **Identifier:** A.1031
REFERENCES: Barbour and Major 1977, Beatley 1976, Bourgeron et al. 1993b, Bourgeron et al. 1995, Bowers 1984, Brown 1982, Brown et al. 1977a, Buffington and Herbel 1965, Burgess 1995, Diamond 1993, Dick-Peddie 1993, Donart et al. 1978a, Eyre 1980, Gardner 1951, Gibbens et al. 1983, Hennessy et al. 1983, Herbel et al. 1972, Hoagland 1998a, Humphrey 1974, McAuliffe 1995, McLaughlin and Bowers 1982, McPherson 1995, Muldavin and Mehlhop 1992, Schlesinger et al. 1990, Smith and Douglas 1989, Stromberg 1995a, Warren and Anderson 1985, Warren and Treadwell 1980, Warren et al. 1981, York and Dick-Peddie 1969

IV. Dwarf-shrubland

IV.A.2.N.a. Extremely xeromorphic evergreen subdesert dwarf-shrubland

IV.A.2.N.a.9. ARTEMISIA NOVA DWARF-SHRUBLAND ALLIANCE

Black Sagebrush Dwarf-shrubland Alliance

ARTEMISIA NOVA / ELYMUS ELYMOIDES DWARF-SHRUBLAND

Black Sagebrush / Bottlebrush Dwarf-shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association is found in the foothills, plateaus and mountains of Nevada and Utah. Stands occur on well-drained slopes, knolls and ridges. Substrates are typically shallow, gravelly or stony soils derived from calcareous parent materials such as limestone. These soils are frequently coarse-textured, but subsoil argillic horizons are common. There is often an impenetrable subsurface layer from a duripan, caliche, or bedrock. *Artemisia nova* plants often grow in adjacent *Artemisia tridentata* shrublands that are found on deeper soils in basins. Combined ground cover of bare ground, rock and gravel is often high (about 70% cover). Litter is concentrated under the shrub canopies. The vegetation is characterized by an open dwarf-shrub canopy (10-30% cover) that is dominated by *Artemisia nova* and a sparse herbaceous layer dominated by the perennial graminoid *Elymus elymoides* with scattered forbs. *Atriplex confertifolia, Artemisia tridentata, Chrysothamnus viscidiflorus, Ephedra nevadensis, Ephedra viridis*, and *Grayia spinosa* are common shrub associates that may be present in smaller amounts. The herbaceous layer includes low cover of species of *Comandra, Cryptantha, Erigeron, Eriogonum, Machaeranthera, Phlox, Penstemon*, and *Poa secunda*. Introduced annual graminoids such as *Bromus rubens* and *Bromus tectorum* are common in disturbed stands.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at elevations of 6000 and 7200 feet on gentle easterly and southerly slopes. Soil texture is described as sandy loam or clay.

Global Environment: This association is found in the foothills, plateaus and mountains of Nevada and Utah. Elevation ranges from 1525-2200 m (5000-7200 feet). Stands occur on well-drained slopes, knolls and ridges. Substrates are typically shallow, gravelly or stony soils often derived from calcareous parent materials such as limestone. These soils are frequentlycoarse-textured, but subsoil argillic horizons are common. There is often an impenetrable subsurface layer from a duripan, caliche, or bedrock. *Artemisia nova* plants often grow in adjacent *Artemisia tridentata* shrublands that are found on deeper soils in basins. Combined ground cover of bareground, rock and gravel is often high (about 70% cover). Litter is concentrated under the shrub canopies.

VEGETATION DESCRIPTION

Zion National Park Vegetation: In this association, *Artemisia nova* is dominant with 30% cover and less than 0.5 m in height. *Elymus elymoides* has 5-20% cover, and codominates with *Poa secunda*. At one site *Ipomopsis congesta* was present with 10% cover, and at the other site, *Astragalus flavus* was present. Bare soil and basalt rockaccounted for significant ground cover between shrubs.

Global Vegetation: This association is characterized by an open dwarf-shrub canopy (10-30% cover) that is dominated by *Artemisia nova* and a sparse herbaceous layer dominated by the perennial graminoid *Elymus elymoides* with scattered forbs. *Atriplex confertifolia, Artemisia tridentata, Chrysothamnus viscidiflorus, Ephedra nevadensis, Ephedra viridis*, and *Grayia spinosa* are common shrub associates that may be present in smaller amounts. Other herbaceous species include *Comandra umbellata ssp. pallida (= Comandra pallida), Cryptantha* spp., *Erigeron* spp., *Eriogonum microthecum, Machaeranthera canescens, Phlox longifolia, Penstemon* spp., and *Poa secunda*. Introduced annual graminoids such as *Bromus rubens* and *Bromus tectorum* are common in disturbed stands.

Global Dynamics: *Artemisia nova* is readily killed by all fire intensities, does not sprout after burning, and is slow to re-invade by seed from off-site sources (Tisdale and Hironaka 1981, Wright et al. 1997). Generally, fire is not a significant ecological process of *Artemisia nova*-dominated communities because the sparse vegetation precludes the occurrence of fire (Wright et al. 1997). Fire frequency may increase because invasion of introduced annual grasses, such as *Bromus tectorum* or *Bromus rubens*, provides fine fuel that allows fires to spread.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
DWARF SHRUB	*Artemisia nova*
GRAMINOID	*Elymus elymoides*

Global

Stratum	Species
DWARF SHRUB	*Artemisia nova*
GRAMINOID	*Elymus elymoides*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
DWARF SHRUB	*Artemisia nova*
GRAMINOID	*Elymus elymoides, Poa secunda*

Global

Stratum	Species
DWARF SHRUB	*Artemisia nova*
GRAMINOID	*Elymus elymoides*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G4G5.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled near Pace Knoll in Kolob Arch quadrangle and in Pine Valley in Guardian Angels quadrangle of Zion National Park.

Global Range: This dwarf-shrubland association occurs in the foothills, plateaus and mountains of Nevada and Utah at elevations above 1525 m (5000 feet).

Nations: US
States/Provinces: NV UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 53, 57
Classification Confidence: 2 **Identifier:** CEGL001418
REFERENCES: Bourgeron and Engelking 1994, Driscoll et al. 1984, Jensen et al. 1988a, Lewis 1975, Ostler et al. 2000, Rickard and Beatley 1965, Tisdale and Hironaka 1981, Wright et al. 1979

ARTEMISIA NOVA / HESPEROSTIPA COMATA DWARF-SHRUBLAND

Black Sagebrush / Needle-and-Thread Dwarf-shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association is found in the foothills, plateaus and mountains of Nevada and Utah. Stands occur on flat mesa tops, benches and plains or on steep pediment slopes, knolls and ridges. Aspects are often southern. Substrates are typically shallow, stony soils often derived from calcareous parent materials such as limestone. Soil textures are variable and range from sandy, loamy, fine-textured or skeletal; argillic subsoil horizons are common. There is often an impenetrable subsurface layer from a duripan, caliche, or bedrock. Combined ground cover of bare ground, rock and gravel is often high (about 70% cover). Litter is concentrated under the shrub canopies. The vegetation is characterized by an open dwarf-shrub canopy (10-30% cover) that is dominated by *Artemisia nova* and a sparse herbaceous layer dominated by the perennial graminoid *Hesperostipa comata* with scattered forbs. Scattered *Chrysothamnus viscidiflorus, Ericameria parryi, Grayia spinosa, Krascheninnikovia lanata*, and *Tetradymia canescens* are common shrub associates that may be present in smaller amounts. *Achnatherum hymenoides, Elymus elymoides, Koeleria macrantha, Pleuraphis jamesii, Poa fendleriana*, or *Poa secunda* may be present in the herbaceous layer, but have sparse cover. Forbs include species of *Astragalus, Erigeron, Eriogonum, Packera, Phlox*, and *Penstemon*. Introduced annual graminoids such as *Bromus rubens* and *Bromus tectorum* are common in disturbed stands.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association was sampled at 8300 feet on a gentle northeast-facing slope, or bluff backslope. Soil texture is clay loam. Small rock fragments contribute 70% to ground cover.

Global Environment: This association is found in the foothills, plateaus and mountains of Nevada and Utah. Elevation ranges from 1890-2530 m (6200-8300 feet). Stands occur on flat mesa tops, benches and plains or on steep pediment slopes, knolls and ridges. Aspects are often southern. Substrates are typically shallow, stony soils often derived from calcareous parent materials such as limestone. Soil textures are variable and range from sandy, loamy, fine-textured or skeletal; argillic subsoil horizons are common. There is often an impenetrable subsurface layer from a duripan, caliche, or bedrock. Combined grounds cover of bare ground, rock and gravel is often high (about 70% cover). Litter is concentrated under the shrub canopies. *Artemisia nova* plants often grow in adjacent *Artemisia tridentata* shrublands that are found on deeper soils in basins.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Artemisia nova* is distributed evenly across the bluff, with 20% cover and height less than 0.5 m. *Gutierrezia sarothrae, Eriogonum microthecum*, and *Opuntia macrorhiza* contribute sparse cover in the dwarf-shrub layer. Perennial grasses, including *Hesperostipa comata* (10%cover), *Poa secunda, Elymus elymoides, Pseudoroegneria spicata*, and *Poa fendleriana*, totaling 25% cover, emerge above the shrub layer. Forb species present are *Penstemon eatonii, Petradoria pumila*, and *Hymenopappus filifolius*.

Global Vegetation: This association is characterized by an open dwarf-shrub canopy (10-30% cover) that is dominated by *Artemisia nova* and a sparse to moderately dense herbaceous layer dominated by the perennial graminoid *Hesperostipa comata* with scattered forbs. Scattered *Chrysothamnus viscidiflorus, Ericameria parryi, Eriogonum microthecum, Grayia spinosa, Gutierrezia sarothrae, Krascheninnikovia lanata*, and *Tetradymia canescens* are common shrub associates that may be present in smaller amounts. *Achnatherum hymenoides, Elymus elymoides, Koeleria macrantha, Pleuraphis jamesii, Poa fendleriana*, or *Poa secunda* may be present in the herbaceous layer, but have sparse cover. Other herbaceous species include *Astragalus* spp., *Erigeron* spp., *Eriogonum racemosum, Hymenopappus filifolius, Leptodactylon pungens, Packera multilobata, Phlox longifolia*, and *Penstemon* spp. Introduced annual graminoids such as *Bromus rubens* and *Bromus tectorum* are common in disturbed stands.

Global Dynamics: *Artemisia nova* is readily killed by all fire intensities, does not sprout after burning, and is slow to re-invade by seed from off-site sources (Tisdale and Hironaka 1981, Wright et al. 1997). Generally, fire is not a significant ecological process of *Artemisia nova*-dominated communities because the sparse vegetation precludes the occurrence of fire (Wright et al. 1997). Fire frequency may increase by invasion of introduced annual grasses, such as *Bromus tectorum* or *Bromus rubens*, providing fine fuels that allow fires to spread. The common associate *Chrysothamnus viscidiflorus* does sprout after fire and may replace *Artemisia nova* where fires are more frequent (Roberts et al. 1992).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
DWARF SHRUB	*Artemisia nova*
GRAMINOID	*Hesperostipa comata, Elymus elymoides, Poa fendleriana*

Global

Stratum	Species
DWARF SHRUB	*Artemisia nova*
GRAMINOID	*Hesperostipa comata*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
DWARF SHRUB	*Artemisia nova*
GRAMINOID	*Hesperostipa comata*

Global

Stratum	Species
DWARF SHRUB	*Artemisia nova*
GRAMINOID	*Hesperostipa comata*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G3?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled on the western side of Horse Ranch Mountain in Zion National Park and may occur infrequently in the northern region.

Global Range: This dwarf-shrubland association occurs in the foothills, plateaus and mountains of Nevada and Utah at elevations above 1890 m (6200 feet).

Nations: US
States/Provinces: CO ID NV UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 116
Classification Confidence: 1 **Identifier:** CEGL001425
REFERENCES: Baker and Kennedy 1985, Blackburn et al. 1968c, Bourgeron and Engelking 1994, Driscoll et al. 1984, Roberts et al. 1992, Tisdale and Hironaka 1981, Wright et al. 1979, Zamora and Tueller 1973

ARTEMISIA NOVA / POA FENDLERIANA DWARF-SHRUBLAND [PROVISIONAL]

Black Sagebrush / Muttongrass Dwarf-shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs between 6000 and 8000 feet. The sites sampled had clay loam soils on level terrain between two ridges.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: In this association, *Artemisia nova* has 10-25% cover and height of less than 0.5 m. *Amelanchier utahensis* is generally present and of short stature, but does not contribute significant cover. *Poa fendleriana* is the dominant graminoid, with cover of 10-20%. Other associated grasses are *Elymus elymoides, Bouteloua gracilis*, and *Koeleria macrantha*. Forb species present are *Calochortus nuttallii, Lotus utahensis, Eriogonum* spp., *Arenaria fendleri*, and *Astragalus* spp.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
DWARF SHRUB	*Amelanchier utahensis, Artemisia nova*
GRAMINOID	*Elymus elymoides,Poa fendleriana*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
DWARF SHRUB	*Artemisia nova*
GRAMINOID	*Poa fendleriana*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled on the backside of the ridge west of Scenic Drive Overlook in the Kolob Arch quadrangle and near Lava Point Road in the Kolob Reservoir quadrangle. This association is not widespread in the park, but may occur again in the vicinity of the above-named areas.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH17, 21
Classification Confidence: **Identifier:** CEGL002698
REFERENCES: None available.

IV.B.2.N.a. Caespitose cold-deciduous dwarf-shrubland

IV.B.2.N.a.200. GUTIERREZIA SAROTHRAE DWARF-SHRUBLAND ALLIANCE
Snakeweed Dwarf-shrubland Alliance

GUTIERREZIA SAROTHRAE - (OPUNTIA SPP.) / PLEURAPHIS JAMESII DWARF-SHRUBLAND

Snakeweed - (Prickly-pear species) / James' Galleta Dwarf-shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This dwarf-shrubland was described from Utah and northern Arizona where it occurs on level to gently sloping hillslopes, plateaus and bluffs. Aspects are reported from the southeast, south and southwest. Soils are variable, but tend to be fine-textured and may occur over gravel and cobbles. Disturbance may be important in maintaining this vegetation community as some stands have been created by chaining of trees and improper grazing by livestock. This broadly defined association is characterized by an open dwarf-shrub canopy (10-30% cover) that is dominated by *Gutierrezia sarothrae*, frequently with *Opuntia* spp. and an herbaceous layer with *Pleuraphis jamesii* present to abundant (1-30% cover). Some stands have a diverse woody layer that includes low cover of several shrub species and occasional *Pinus edulis* or *Juniperus osteosperma* trees. The herbaceous layer is typically dominated by graminoids with several species present including *Pleuraphis jamesii, Achnatherum hymenoides, Aristida purpurea, Bouteloua gracilis, Elymus elymoides, Hesperostipa comata*, or *Pascopyrum smithii*. There is usually only sparse cover of native forbs like *Chamaesyce* spp. or *Sphaeralcea coccinea.* Introduced species such as *Bromus tectorum* or *Salsola kali* may dominate the herbaceous layer of some disturbed stands.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at elevations around 4000 feet on gently sloping hillsides with a southeastern aspect. Soils are clayey in comparison to most of the very sandy soils throughout the park. One sample documents this association at 7400 feet with different herbaceous components.

Global Environment: This association is described from Utah and northern Arizona where it occurs on level to gently sloping hillslopes, plateaus and bluffs. Elevations range from 1350-2260 m. Aspects are reported from the southeast, south and southwest. Soils are variable, but tend to be fine-textured and may occur over gravel and cobbles. Disturbance may be important in maintaining this vegetation community as some stands have been created by chaining of trees and improper grazing by livestock.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Average foliar cover of *Gutierrezia sarothrae* is 10%, and *Opuntia* spp. are present to abundant in this association. *Pleuraphis jamesii* ranges from absent to abundant. Other species that occur at the sampled sites are *Psorothamnus fremontii, Coleogyne ramosissima, Juniperus osteosperma, Elymus elymoides*, and *Bromus tectorum*. At the high-elevation site, *Poa fendleriana, Bouteloua gracilis, Arenaria fendleri*, and *Eriogonum umbellatum* dominate the herbaceous layer.

Global Vegetation: This broadly defined association is characterized by an open dwarf-shrub canopy (10-30% cover) that is dominated by *Gutierrezia sarothrae*, frequently with *Opuntia* spp. and an herbaceous layer with *Pleuraphis jamesii* present to abundant (1-30% cover). Some stands have a diverse woody layer that includes low cover of *Artemisia nova, Atriplex canescens, Atriplex confertifolia, Chrysothamnus viscidiflorus, Coleogyne ramosissima, Ephedra* spp., *Eriogonum* spp., *Grayia spinosa, Lycium pallidum, Purshia tridentata*, or occasional *Pinus edulis* or *Juniperus osteosperma* trees. The herbaceous layer is typically dominated by graminoids with several species present including *Pleuraphis jamesii, Achnatherum hymenoides, Aristida purpurea, Bouteloua gracilis, Elymus elymoides, Hesperostipa comata*, or *Pascopyrum smithii*. There is usually only sparse cover of native forbs like *Chamaesyce* spp. or *Sphaeralcea coccinea.* Introduced species such as *Bromus tectorum, Erodium cicutarium, Sisymbrium altissimum*, or *Salsola kali* may dominate the herbaceous layer of some disturbed stands.

Global Dynamics: *Gutierrezia sarothrae* occurs in many natural grassland and steppe communities in the western U.S. and is known to increase when these communities are disturbed mechanically or by over-grazing (Stubbendieck et al. 1992, USFS 1937). The role of disturbance in this association needs further study to understand its successional nature.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Gutierrezia sarothrae, Opuntia* spp.
GRAMINOID	*Bromus tectorum, Elymus elymoides,Pleuraphis jamesii*

Global

Stratum	Species
DWARF SHRUB	*Gutierrezia sarothrae*
GRAMINOID	*Pleuraphis jamesii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Gutierrezia sarothrae, Opuntia* spp.
GRAMINOID	*Pleuraphis jamesii*

Global

Stratum	Species
DWARF SHRUB	*Gutierrezia sarothrae*
GRAMINOID	*Pleuraphis jamesii*

GLOBAL SIMILAR ASSOCIATIONS:

- Gutierrezia sarothrae / Pleuraphis rigida Shrub Herbaceous Vegetation (CEGL001543)--possibly an anthropogenicly disturbed *Pleuraphis rigida* grassland.
- Gutierrezia sarothrae - Krascheninnikovia lanata - Atriplex canescens / Bouteloua eriopoda Shrub Herbaceous Vegetation (CEGL001733)--rare grassland endemic to Grand Canyon National Park.
- Gutierrezia sarothrae / Sporobolus airoides - Pleuraphis jamesii Shrub Herbaceous Vegetation (CEGL001776)--described from northwestern New Mexico.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: This broadly defined dwarf-shrubland includes stands that could also be classified as a dwarf-shrub herbaceous association.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is commonly found in the southwestern region of the park where elevation is low and the climate is very dry.

Global Range: This association is described from Utah and northern Arizona, but is likely more widespread throughout the semi-arid western U.S.

Nations: US
States/Provinces: AZ UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH37, 39, 40, 41, 56, 266, 505
Classification Confidence: 3 **Identifier:** CEGL002690
REFERENCES: Stubbendieck et al. 1992, USFS 1937, Von Loh et al. 2002

V. HERBACEOUS VEGETATION

V.A.5.N.c. Medium-tall sod temperate or subpolar grassland

V.A.5.N.c.201. THINOPYRUM INTERMEDIUM SEMI-NATURAL HERBACEOUS ALLIANCE

Intermediate Wheatgrass Semi-natural Herbaceous Alliance

THINOPYRUM INTERMEDIUM SEMI-NATURAL HERBACEOUS VEGETATION

Intermediate Wheatgrass Semi-natural Herbaceous Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This *Thinopyrum intermedium* type occurs widely throughout the northern Great Plains of the United States, and perhaps more widely in the Midwest and Canada. Stands can occur in a wide variety of human-disturbed habitats, and *Thinopyrum intermedium (= Agropyron intermedium)* is widely planted as pasture and hayland along road ditches for Conservation Reserve Program lands, and in dense-nesting-cover mixes. It is commonly found on reseeded cultivated lands planted with legumes such as sweet clover and alfalfa and may also have escaped into surrounding habitats. It is most abundant on dry, medium-textured soils, but has adapted to a broad range of soil textures and moisture conditions. Vegetation is primarily medium-tall (0.5-1 m) graminoids and dominated by *Thinopyrum intermedium*, a naturalized, cool-season grass species from eastern Europe. Other weedy species such as *Bromus inermis* may occur as well, but native species are generally less than 20% cover. Native grass species will rarely, if ever, reestablish in sites dominated by *Thinopyrum intermedium*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on a dry meadow site on a gently sloping, northeast-facing ridge. Soils are clay loam and may be seasonally saturated.

Global Environment: The *Thinopyrum intermedium* type occurs widely throughout the northern Great Plains of the United States, and perhaps more widely in the Midwest and Canada. It also is reported from Utah and likely occurs elsewhere in the western U.S. Stands can occur in a wide variety of human-disturbed habitats, and is widely planted as pasture and hayland along road ditches for Conservation Reserve Program lands, and in dense-nesting-cover mixes (D. Ode pers. comm.). It is commonly found on reseeded cultivated lands planted with legumes such as sweet clover and alfalfa and may also have escaped into surrounding habitats (D. Ode pers. comm.). It is most abundant on dry, medium-textured soils, but has adapted to a broad range of soil textures and moisture conditions. Vegetation is primarily medium-tall (0.5-1 m) graminoids and dominated by *Thinopyrum intermedium (= Agropyron intermedium)*, a naturalized, cool-season grass species from eastern Europe. Other weedy species such as *Bromus inermis* may occur as well, but native species are generally less than 20% cover. Native grass species will rarely, if ever, reestablish in sites dominated by *Thinopyrum intermedium*.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association is dominated by intermediate wheatgrass with 60-70% cover. Herbaceous vegetation of *Bromus inermis, Achnatherum lettermanii, Artemisia ludoviciana, Vicia americana, Mertensia arizonica*, and *Lupinus* spp. together contribute less than 10% cover. Evidence of recent livestock grazing is apparent, and grazing has probably occurred at this site occasionally since the park was established. Historically, the site was probably subjected to moderate to heavy grazing.

Global Vegetation: *Thinopyrum intermedium (= Agropyron intermedium, = Elytrigia intermedia)* often contributes 90% of the cover for this community; however, other exotics such as *Bromus inermis* can invade into these areas. Native species almost never reestablish in areas dominated by *Thinopyrum intermedium* and contribute less than 20% cover.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Thinopyrum intermedium, Bromus inermis*
FORB	*Artemisia ludoviciana, Vicia americana, Lupinus spp.*

Global

Stratum	Species
GRAMINOID	*Thinopyrum intermedium*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Thinopyrum intermedium*
FORB	*Artemisia ludoviciana*

Global

Stratum	Species
GRAMINOID	*Thinopyrum intermedium*

GLOBAL SIMILAR ASSOCIATIONS:

- Bromus inermis - (Pascopyrum smithii) Semi-natural Herbaceous Vegetation (CEGL005264)--*Bromus inermis* will often invade into *Thinopyrum intermedium* communities.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: GW.

Global Comments: This type was first proposed based on work at Zion National Park. It is futher developed based on data from Lacreek National Wildlife Refuge and comments by Dave Ode.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on a ridge north of Camp Creek, the most northern region of the park.

Global Range: The *Thinopyrum intermedium* type occurs widely throughout the northern Great Plains of the United States, and perhaps more widely in the Midwest and Canada. It also is reported from Utah and likely occurs elsewhere in the western U.S. where it has been seeded or escaped from plantings.

Nations: US
States/Provinces: MN? ND? NE SD UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 118
Classification Confidence: 3 **Identifier:** CEGL002935
REFERENCES: Ode pers. comm.

V.A.5.N.d. Medium-tall bunch temperate or subpolar grassland

V.A.5.N.d.400. BROMUS INERMIS SEMI-NATURAL HERBACEOUS ALLIANCE

Smooth Brome Semi-natural Herbaceous Alliance

BROMUS INERMIS - (PASCOPYRUM SMITHII) SEMI-NATURAL HERBACEOUS VEGETATION

Smooth Brome - (Western Wheatgrass) Semi-natural Herbaceous Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This smooth brome grassland type occurs widely throughout the northern Great Plains and on relatively mesic sites in the semi-arid interior western United States, and perhaps more widely in the midwestern U.S. and Canada. Stands can occur in a wide variety of human-disturbed habitats, including highway rights-of-way, jeep trails, etc. The type is also widely planted for revegetating disturbed land, pasture, and hay fields, and has escaped into a variety of habitats including prairie, riparian grasslands, and mesic mountain meadows. In Montana, the best examples occur on mesic alluvial terraces. This grass grows best on moist, well-drained, finer-textured loam and clay loams and does not tolerate prolonged flooding. The vegetation is dominated by medium-tall (0.5-1 m) graminoids. The dominant grass is *Bromus inermis*, a naturalized species from Eurasia, that forms moderately dense to dense stands that often develop into monocultures. Other weedy species such as *Cirsium arvense* may occur as well, but native species are generally less than 10% cover. Native species may include mixed-grass prairie and montane meadow grasses, such as *Pascopyrum smithii, Deschampsia caespitosa*, and *Hesperostipa comata (= Stipa comata)* and sparse, scattered mesic shrubs such as *Symphoricarpos* spp. as well as many others. However, the native species are not conspicuous enough to identify the native plant association that could occupy the site or the stand would be typed as such.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on gentle, 0- to 5-degree slopes in moderate- to high-elevation meadows where slow drainage or spring snowmelt creates moist or seasonally saturated soils. Documented stands occurred on south to southwest aspects. Disturbances such as prior water development construction and/or livestock grazing may have impacted these sites.

Global Environment: This smooth brome grassland type occurs widely throughout the northern Great Plains and on relatively mesic sites in the semi-arid interior western United States, and perhaps more widely in the midwestern U.S. and Canada. Stands can occur in a wide variety of human-disturbed habitats, including highway rights-of-way, jeep trails, etc. The type is also widely planted for revegetating disturbed land, pasture, and hay fields, and has escaped into a variety of habitats including prairie, riparian grasslands, and mesic mountain meadows. In Montana, this community is found on elevation ranges from 1100-2050 m (3590-6700 feet) with best examples occurring on mesic alluvial terraces (Hansen et al. 1995). This grass grows best on moist, well-drained, finer-textured loam and clay loams, not heavy clays or sand, and does not tolerate prolonged flooding (Hansen et al. 1995).

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Bromus inermis* dominates this association with 50-90% cover. *Pascopyrum smithii* contributes an additional 5% cover on the margin of the sampled stands. Other herbaceous species may contribute minor cover. *Symphoricarpos oreophilus* may be present and sparsely distributed in the stand as it invades from adjacent drier upland vegetation.

Global Vegetation: This association is dominated by medium-tall (0.5-1 m) graminoids. The dominant grass is *Bromus inermis*, a naturalized species from Eurasia, that forms moderately dense to dense stands that often develop into monocultures. Other weedy species such as *Cirsium arvense* may occur as well, but native species are generally less than 10% cover. Native species may include mixed-grass prairie and montane meadow grasses, such as *Pascopyrum smithii, Deschampsia caespitosa*, and *Hesperostipa comata (= Stipa comata)* and sparse, scattered mesic shrubs such as *Symphoricarpos* spp. as well as many others. However, the native species are not conspicuous enough to identify the native plant association that could occupy the site or the stand would be typed as such.

Global Dynamics: *Bromus inermis* is a strongly rhizomatous, cool-season grass that grows 0.5-1 (1.5) m tall (Cronquist et al. 1977). It is a highly competitive, sod-forming grass with a dense fibrous root and rhizome system.

The extensive rhizome system allows it to rapidly spread and makes it able to tolerate heavy grazing by livestock (Hansen et al 1995). Although this grass grows best on moist alluvial sites, it does not tolerate prolonged flooding (Hansen et al. 1995). It also has good drought resistance, which allows it to persist in semi-arid regions (Cronquist et al. 1977). Flooding of infested riparian areas has been used to restore native riparian or wetland species in degraded (de-watered) sites (Hansen et al. 1995). *Bromus inermis* is also fire-adapted and will vigorously sprout after most burns (Hansen et al. 1995). However, this cool-season grass is not tolerant of hot, late-spring burns, which is during its active growing period (Hansen et al. 1995). This may be an effective control measure where native vegetation is dominated by warm-season grasses.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Bromus inermis, Pascopyrum smithii*

Global

Stratum	Species
GRAMINOID	*Bromus inermis, Pascopyrum smithii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Bromus inermis*

Global

Stratum	Species
GRAMINOID	*Bromus inermis*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: GW.

Global Comments: Where native species are conspicuous enough to identify the native plant association that could occupy the site, the stand should be typed as such. *Bromus inermis* occurs widely throughout the midwestern and western U.S., and perhaps this association should be broadened to include almost any stand dominated almost exclusively by *Bromus inermis*.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on Horse Pasture Plateau and the East Rim Mesa and may occur in other gently sloping meadows or drainages on plateaus throughout Zion National Park.

Global Range: This type occurs widely throughout the northern Great Plains and in relatively mesic sites in Utah and Wyoming, and perhaps more widely in the midwestern U.S. and Canada as well as the western United States where *Bromus inermis* has escaped from revegetation and forage plantings.

Nations: US
States/Provinces: MT ND SD UT WY

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 49, 83. *Bromus inermis - (Pascopyrum smithii)* Semi-natural Herbaceous Vegetation (CEGL005264) may be associated with disturbance such as past cattle grazing or water developments. The site documented on the East Mesa drainage appears to have been created by a water development or flood control project. Cattle grazing at one time likely disturbed the site at Sawmill Springs.
Classification Confidence: 3 **Identifier:** CEGL005264
REFERENCES: Cronquist et al. 1977, Hansen et al. 1995

V.A.5.N.d.27. HESPEROSTIPA COMATA BUNCH HERBACEOUS ALLIANCE

Needle-and-Thread Bunch Herbaceous Alliance

HESPEROSTIPA COMATA GREAT BASIN HERBACEOUS VEGETATION

Needle-and-Thread Great Basin Herbaceous Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This grassland occurs on the Colorado Plateau and Great Basin. Stands are found on plains, gentle hillslopes, knolls and bluffs, mesa tops, and plateau parks. Substrates are variable and include sand, cobbles, clay loams and silty clay. This association is characterized by a relatively sparse to moderate herbaceous layer (10-40% cover) that is strongly dominated by the cool-season bunchgrass *Hesperostipa comata*. Low cover of other grasses, such as *Achnatherum hymenoides, Achnatherum lettermanii, Aristida purpurea, Elymus elymoides, Pleuraphis jamesii, Poa fendleriana*, or *Sporobolus cryptandrus*, may be present. However, *Bouteloua eriopoda* is not present. Forb cover ranges from sparse to moderate and may be diverse. Associated species may be diverse and include species of *Artemisia, Balsamorhiza, Cirsium, Gilia, Hymenopappus, Lappula, Machaeranthera*, and *Vicia*. Scattered shrubs and dwarf-shrubs may be present with less than 5% total cover. The widespread introduced annual grass *Bromus tectorum* often contributes significant cover in disturbed stands. Some stands have high cover of cryptogams on the soil.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on flat terrain or slight depressions of mesa tops and, at one site, the depression of a cinder cone. Elevations range 6400-7600 feet, and soil texture is sandy or clay loam.

Global Environment: This grassland occurs in the Colorado Plateau and Great Basin. Elevation ranges from 1450-2320 m. Stands are found on plains, gentle hillslopes, knolls and bluffs, mesa tops, and plateau parks. Substrates are variable and include sand, cobbles, clay loams and silty clay. Fires may be important in maintaining these grasslands by reducing woody cover, but burning during the growing season could also damage the *Hesperostipa comata* plants.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Hesperostipa comata* dominates this association with 10-40% cover and heights of 0.5 m. Other graminoids present in the sampled associations are *Achnatherum lettermanii, Poa fendleriana, Elymus elymoides*, and *Poa pratensis*. Some shrubs that may be present with less than 5% cover are *Chrysothamnus viscidiflorus, Symphoricarpos oreophilus*, and *Artemisia tridentata ssp. vaseyana*. Forbs contribute another 20-30% herbaceous cover. Forbs present among the three sites sampled are *Machaeranthera canescens, Tragopogon dubius, Cirsium arizonicum, Artemisia ludoviciana, Artemisia dracunculus, Artemisia campestris, Vicia americana, Lotus utahensis, Penstemon* spp., *Aster* spp., *Eriogonum racemosum, Balsamorhiza sagittata, Comandra umbellata, Ericameria linearifolia, Hymenopappus filifolius, Antennaria* sp., and *Epilobium brachycarpum*.

Global Vegetation: This association is characterized by a relatively sparse to moderate herbaceous layer (10-40% cover) that is strongly dominated by the cool-season bunchgrass *Hesperostipa comata*. Low cover of other grasses, such as *Achnatherum hymenoides, Achnatherum lettermanii, Aristida purpurea, Elymus elymoides, Pleuraphis jamesii, Poa fendleriana*, or *Sporobolus cryptandrus*, may be present. However, *Bouteloua eriopoda* is not present. Forb cover ranges from sparse to moderate and may be diverse. Associated species include *Artemisia campestris, Artemisia dracunculus, Artemisia ludoviciana, Balsamorhiza sagittata, Cirsium arizonicum, Hymenopappus filifolius, Machaeranthera canescens, Vicia americana*, and species of *Antennaria, Eriogonum, Gilia*, and *Lappula*. Scattered shrubs and dwarf-shrubs may present with less than 5% total cover. *Artemisia tridentata ssp. vaseyana, Chrysothamnus viscidiflorus, Ericameria nauseosa, Opuntia polyacantha, Gutierrezia sarothrae*, and *Symphoricarpos oreophilus* have been reported from this grassland. The widespread introduced annual grass *Bromus tectorum* often contributes significant cover in disturbed stands. Several other exotic species like *Salsola kali, Bassia scoparia (= Kochia scoparia)*, *Poa pratensis,* and *Sisymbrium altissimum* may be present to abundant. Some stands have high cover of cryptogams on the soil including *Collema tenax, Tortula ruralis, Bellia papillata*, and *Fulgensia bracteata* (Kleiner and Harper 1977).

Global Dynamics: These grasslands are dominated by relatively deep-rooted grasses that use soil moisture below 0.5 m during the typically dry summers. The coarse-textured soils allow for rapid infiltration and storage of winter and summer precipitation (Daubenmire 1970, Kleiner 1968, Kleiner and Harper 1977, Thilenius et al. 1995). Fires during dormancy may be important in maintaining these grasslands by reducing woody cover. However, burning during the growing season generally kills or severely damages *Hesperostipa comata* plants. After fire, regeneration of this non-rhizomatous bunchgrass is by seed and may take many years to reach prefire densities (FEIS 1998).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Achnatherum lettermanii, Hesperostipa comata*

Global

Stratum	Species
GRAMINOID	*Hesperostipa comata*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Hesperostipa comata*

Global

Stratum	Species
GRAMINOID	*Hesperostipa comata*

GLOBAL SIMILAR ASSOCIATIONS:

- Muhlenbergia montana - Hesperostipa comata Herbaceous Vegetation (CEGL001647)
- Pseudoroegneria spicata - Hesperostipa comata Herbaceous Vegetation (CEGL001679)
- Hesperostipa comata - Carex filifolia Herbaceous Vegetation (CEGL001700)
- Hesperostipa comata - Achnatherum hymenoides Herbaceous Vegetation (CEGL001703)
- Hesperostipa comata - Poa secunda Herbaceous Vegetation (CEGL001704)
- Elymus lanceolatus - Hesperostipa comata Herbaceous Vegetation (CEGL001746)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G2G4.

Global Comments: This association is composed of relatively pure *Hesperostipa comata* grasslands in the Intermountain West. The similar associations are distinguished by the codominance of other grass species or a shrub layer.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled on a mesa overlooking Beartrap Canyon, an unnamed mesa north of Wynopits Mesa, and in the cinder cone depression of Firepit Knoll. All these sites occur in the northern region of Zion National Park. This association was observed in stands less than 0.5 hectare in size scattered on mesas on the eastern side of the park.

Global Range: This grassland is found in the Colorado Plateau and Great Basin in Colorado and Utah and will probably occur in adjacent states.

Nations: US
States/Provinces: CO UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 63, 271, 352
Classification Confidence: 2 **Identifier:** CEGL001705
REFERENCES: Bourgeron and Engelking 1994, Daubenmire 1970, Driscoll et al. 1984, FEIS 1998, Kleiner 1968, Kleiner 1983, Kleiner and Harper 1977, Thilenius et al. 1995

V.A.5.N.d.17. MUHLENBERGIA MONTANA HERBACEOUS ALLIANCE
Mountain Muhly Herbaceous Alliance

MUHLENBERGIA (PUNGENS, MONTANA) - HETEROTHECA VILLOSA HERBACEOUS VEGETATION [PROVISIONAL]

(Sandhill Muhly, Mountain Muhly) - Hairy Goldenaster Herbaceous Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at elevations of 6500 and 7100 feet on flat mesa tops with sandy soils. The ground surface has 20-30% cover of lichens and cryptograms and 50-70% bare soil.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: The herbaceous layer is prominent in this association with 20% cover. *Muhlenbergia pungens* is more commonly found in this association than *Muhlenbergia montana*, though the latter has been sampled in this study, and the former only observed. *Heterotheca villosa* is present to abundant. Other associated herbaceous species include *Achillea millefolium, Machaeranthera canescens, Phlox austromontana, Poa fendleriana,* and *Sporobolus cryptandrus.* Scattered shrubs may be present including *Arctostaphylos patula, Quercus gambelii, Symphoricarpos oreophilus, Yucca elata var. utahensis, Opuntia macrorhiza*, and *Gutierrezia* spp. with low cover (<10% cover total). Dominance of *Muhlenbergia pungens* and/or *Muhlenbergia montana* is diagnostic of this grassland association.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Muhlenbergia montana, Muhlenbergia pungens, Poa fendleriana, Sporobolus cryptandrus*
FORB	*Heterotheca villosa*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Muhlenbergia montana, Muhlenbergia pungens*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on the Incline Temple and Great White Throne mesas of Zion National Park and has been observed in basins below mesas on the eastern side.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 355, 382
Classification Confidence: 3 **Identifier:** CEGL002938
REFERENCES: None available.

V.A.5.N.d.9. SPOROBOLUS CRYPTANDRUS HERBACEOUS ALLIANCE

Sand Dropseed Herbaceous Alliance

SPOROBOLUS CRYPTANDRUS GREAT BASIN HERBACEOUS VEGETATION

Sand Dropseed Great Basin Herbaceous Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This plant association is described from the Uinta Basin and Colorado Plateau where it occurs on alluvial terraces of major rivers and on sand deposits on mesas and plains. Soils are loamy sands and sandy loams derived from alluvium, aeolian deposits or sandstone residuum. Sites have generally been disturbed by flooding, shifting sands, livestock grazing, or human recreation. The vegetation is dominated by the warm-season perennial graminoid *Sporobolus cryptandrus*. *Pleuraphis jamesii, Hesperostipa comata (= Stipa comata)*,or *Equisetum variegatum* frequently occur in low abundance. Low cover of native forbs such as *Sphaeralcea grossulariifolia* or *Chamaesyce fendleri* may be present. The introduced annual grass *Bromus tectorum* and several other exotic species like *Bromus rigidus, Salsola kali, Helianthus annuus, Sisymbrium altissimum*, or *Tribulus terrestris* may be present to abundant, especially on disturbed riparian stands. Occasional *Brickellia* spp. or other shrubs may occur, but they are not dense enough to form a shrub layer.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association is documented at elevations less than 4500 feet, but may occur in small stands of less than 0.5 hectare on mesa tops and flat benches where deep, sandy loam soils develop. Larger than 0.5-hectare stands occur on sandy alluvial benches adjacent to river floodplains.

Global Environment: This grassland is described from the Uinta Basin and Colorado Plateau where it occurs on alluvial terraces of large rivers and on sand deposits on mesas and plains. Elevation ranges from 1243-1450 m. Sites are flat to gently sloping valley bottoms, plains or plateaus. Soils are loamy sands and sandy loams derived from alluvium, aeolian deposits or sandstone residuum. Stands have generally been disturbed by flooding, shifting sands, livestock grazing, or human recreation.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Stands of *Sporobolus cryptandrus* have low cover of 10-30%. Additional herbaceous cover is minimal and frequently represented by exotic grasses, such as *Bromus tectorum* and *Bromus diandrus*, and various weedy forbs. *Pleuraphis jamesii* may occur with foliar cover of less than 10%.

Global Vegetation: This plant association is found on alluvial terraces of large rivers and on sand deposits on mesas and plains. The sparse to moderately dense (10-30% cover) herbaceous layer is characterized by the dominance of the warm-season perennial graminoid *Sporobolus cryptandrus*. *Pleuraphis jamesii, Hesperostipa comata (= Stipa comata)*,or *Equisetum variegatum* frequently occur in low abundance. Low cover of native forbs such as *Sphaeralcea grossulariifolia* or *Chamaesyce fendleri* may be present. The widespread introduced annual grass *Bromus tectorum* and several other exotic species like *Bromus rigidus, Salsola kali, Helianthus annuus, Sisymbrium altissimum*, or *Tribulus terrestris* may be present to abundant, especially on disturbed riparian stands. An occasional *Brickellia* spp or other shrubs may occur, but they are not dense enough to form a shrub layer. Moss is important in some stands.

Global Dynamics: Disturbance is present and appears to be important in the maintenance of this vegetation. *Sporobolus cryptandrus* occurs throughout the western U.S. as a minor species, occasionally becoming locally dominant in disturbed or sandy sites in the midgrass prairie (Weaver and Albertson 1956). This perennial grass produces prolific seeds that are long-lived in the soil (20 years), and is observed to increase in abundance on disturbed and grazing-depleted ranges (USFS 1937).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Bromus tectorum, Pleuraphis jamesii, Sporobolus cryptandrus*

Global

Stratum	Species
GRAMINOID	*Bromus tectorum, Sporobolus cryptandrus*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Sporobolus cryptandrus*

Global

Stratum	Species
GRAMINOID	*Sporobolus cryptandrus*

GLOBAL SIMILAR ASSOCIATIONS:

- Sporobolus cryptandrus Shrub Herbaceous Vegetation (CEGL001514)--similar vegetation except with significant shrub component.
- Aristida purpurea var. longiseta - Sporobolus cryptandrus Herbaceous Vegetation (CEGL001515)--similar vegetation and environmental conditions except codominated by *Aristida purpurea var. longiseta*.
- Sporobolus cryptandrus - Poa secunda Herbaceous Vegetation (CEGL001516)--similar vegetation and environmental conditions except codominated by *Poa secunda*.
- Artemisia tridentata / Sporobolus cryptandrus - Achnatherum hymenoides Shrub Herbaceous Vegetation (CEGL001545)
- Aristida purpurea var. longiseta - Pseudoroegneria spicata - Sporobolus cryptandrus Herbaceous Vegetation (CEGL001589)--similar vegetation and environmental conditions except codominated by *Aristida purpurea var. longiseta - Pseudoroegneria spicata*.
- Ephedra viridis / Achnatherum hymenoides - Sporobolus cryptandrus Shrub Herbaceous Vegetation (CEGL001649)--sandy site grasslands with shrub layer.
- Bouteloua gracilis - Sporobolus cryptandrus Herbaceous Vegetation (CEGL001761)
- Schizachyrium scoparium - Aristida basiramea - Sporobolus cryptandrus - Eragrostis trichodes Herbaceous Vegetation (CEGL005221)--central Great Plains type.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: The association is broadly defined to include *Sporobolus cryptandrus*-dominated stands from both riparian and sandy upland sites. This plant association is similar to the threatened, regionally endemic *Sporobolus cryptandrus* plant associations from the Columbia Basin and lower Snake River that have declined significantly due to loss of habitat from hydroelectric dam construction and conversion of land to cultivation. Many of the riparian stands in these associations are in poor condition because of past management and invasion of introduced species.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is scattered throughout the park from alluvial canyon bottoms to mesa tops. Larger, more homogeneous stands of *Sporobolus cryptandrus* are located in sandy alluvial terraces along the North Fork of the Virgin River and in Cave Valley.

Global Range: The association is found on terraces of large rivers in the Colorado Plateau and likely occurs elsewhere in the southwestern U.S.

Nations: US
States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH 20, 16, 515. This association is in most cases heavily disturbed by humans and livestock due to its close proximity to the main river systems in the park.
Classification Confidence: 1 **Identifier:** CEGL002691
REFERENCES: USFS 1937, Von Loh et al. 2002

V.A.5.N.e. Short sod temperate or subpolar grassland

V.A.5.N.e.9. BOUTELOUA GRACILIS HERBACEOUS ALLIANCE

Blue Grama Herbaceous Alliance

BOUTELOUA GRACILIS - HESPEROSTIPA COMATA HERBACEOUS VEGETATION [PROVISIONAL]

Blue Grama - Needle-and-Thread Herbaceous Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on gently sloping mesa tops with elevations ranging from 5900-7400 feet. Soil texture is loamy sand.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This plant association has an open to moderately dense herbaceous layer that is dominated by grasses with scattered shrubs that form a mosaic. The graminoid layer is codominated by *Bouteloua gracilis* and *Hesperostipa comata* with variable amounts of cover ranging from 5-20% combined. *Poa fendleriana* was present with 10% cover in most stands. Other grasses that occurred were *Muhlenbergia montana* and *Sporobolus cryptandrus*. Shrubs are less consistent in composition among sites sampled and contribute less than 10% cover. Shrub species that are likely to occur in the stand and in nearby shrublands are *Tetradymia canescens, Ericameria nauseosa, Arctostaphylos patula, Artemisia tridentata, Quercus gambelii*, and *Yucca elata var. utahensis*. *Pinus edulis* was present in two sampled sites, but with minimal cover. Pinyon-juniper woodlands are a part of the shrubland/grassland mosaic on a landscape scale.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Bouteloua gracilis, Hesperostipa comata, Poa fendleriana*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Bouteloua gracilis, Hesperostipa comata, Poa fendleriana*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled on Cougar Mountain, Mount Majestic, and Pocket Mesa.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 132, 305, 359
Classification Confidence: 3 **Identifier:** CEGL002932
REFERENCES: None available.

V.A.5.N.e.14. PLEURAPHIS JAMESII HERBACEOUS ALLIANCE

James' Galleta Herbaceous Alliance

PLEURAPHIS JAMESII HERBACEOUS VEGETATION

James' Galleta Herbaceous Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This widespread grassland association is found on alluvial flats, plateau parks and plains in the Colorado Plateau and elsewhere in the southwestern U.S. Topography varies from mesa tops, slopes, and basin floors. Stands may be small woodland parks or more extensive grasslands on the plains. Soils in bottomland stands tend to be fine-textured; however, stands also occur on sandy loams. Vegetation is characterized by a relatively sparse to moderately dense (10-60% cover) herbaceous layer that is strongly dominated by the warm-season bunchgrass *Pleuraphis jamesii*. Low cover of other grasses, such as *Achnatherum hymenoides, Bouteloua eriopoda, Bouteloua gracilis, Hesperostipa comata, Muhlenbergia porteri, Sporobolus airoides*, or *Sporobolus cryptandrus*, may be present. Forb cover is usually sparse and includes species of *Plantago, Gilia, Lappula*, and prickly pear cacti (*Opuntia* spp.). Many species of shrubs and dwarf-shrubs may be present; however, they are not dense enough to form a shrub layer. Some stands have high cover of cryptogams on the soil.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs at approximately 4000 feet, on level terrain of plateaus. Soil texture is sandy loam.

Global Environment: This widespread grassland association is found on alluvial flats, plateau parks and plains in the Colorado Plateau and elsewhere in the southwestern U.S. Elevation ranges from 1220-1660 m. Topography varies from mesa tops, slopes, and basin floors. Stands may be small woodland parks or more extensive on the plains. Soils in bottomland stands tend to be fine-textured; however, stands also occur on sandy loams.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Pleuraphis jamesii* is dominant in this association with 10-30% cover at the sampled sites. *Opuntia* spp., *Gutierrezia microcephala*, and *Bromus tectorum* are present with minimal cover. This association occurs in parks amongst *Pinus monophylla - Juniperus osteosperma* woodlands with *Pleuraphis jamesii* in the understory.

Global Vegetation: This association is characterized by a relatively sparse to moderately dense herbaceous layer (10-60% cover) that is strongly dominated by the warm-season bunchgrass *Pleuraphis jamesii*. Low cover of other grasses such as *Achnatherum hymenoides, Bouteloua eriopoda, Bouteloua gracilis, Hesperostipa comata, Muhlenbergia porteri, Sporobolus airoides*, or *Sporobolus cryptandrus* may be present. Forb cover is usually sparse and includes species of *Plantago, Gilia, Lappula*, and prickly pear cacti (*Opuntia* spp.). Many species of shrubs and dwarf-shrubs may be present, but they are not abundant enough to form a shrub layer. Woody species may include *Artemisia filifolia, Atriplex canescens, Atriplex confertifolia, Ephedra torreyana, Ericameria nauseosa, Gutierrezia* spp., *Tetradymia* spp., and occasional *Juniperus monosperma* trees. The widespread introduced annual grass *Bromus tectorum* and several other exotic species like *Salsola kali, Bassia scoparia (= Kochia scoparia), Sisymbrium altissimum* may be present to abundant, especially on disturbed sites. Some stands have high cover of cryptogams on the soil including *Collema tenax, Tortula ruralis, Bellia papillata*, and *Fulgensia bracteata*.

Global Dynamics: *Pleuraphis jamesii* is both drought- and grazing-resistant (USFS 1937, Weaver and Albertson 1956, West et al. 1972). This grass is favored in mixedgrass stands because it is only moderately palatable to livestock; however, it decreases when heavily grazed during drought and in the more arid portions of its range where it is the dominant grass (West et al. 1972). This grass reproduces extensively from scaly rhizomes. These rhizomes make the plant resistant to trampling by livestock and have good soil binding properties (USFS 1937, Weaver and Albertson 1956, West et al. 1972).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Pleuraphis jamesii*

Global

Stratum	Species
GRAMINOID	*Pleuraphis jamesii*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Pleuraphis jamesii*

Global

Stratum	Species
GRAMINOID	*Pleuraphis jamesii*

GLOBAL SIMILAR ASSOCIATIONS:

- Atriplex canescens / Pleuraphis jamesii Shrubland (CEGL001288)
- Atriplex confertifolia / Pleuraphis jamesii Shrubland (CEGL001304)
- Krascheninnikovia lanata / Pleuraphis jamesii Dwarf-shrubland (CEGL001322)
- Coleogyne ramosissima / Pleuraphis jamesii Shrubland (CEGL001334)
- Artemisia nova / Pleuraphis jamesii Dwarf-shrubland (CEGL001420)
- Atriplex gardneri / Pleuraphis jamesii Dwarf-shrubland (CEGL001441)
- Bouteloua eriopoda - Pleuraphis jamesii Herbaceous Vegetation (CEGL001751)
- Bouteloua gracilis - Pleuraphis jamesii Herbaceous Vegetation (CEGL001759)
- Atriplex obovata / Pleuraphis jamesii - Sporobolus airoides Dwarf-shrub Herbaceous Vegetation (CEGL001775)
- Gutierrezia sarothrae / Sporobolus airoides - Pleuraphis jamesii Shrub Herbaceous Vegetation (CEGL001776)
- Pleuraphis jamesii - Sporobolus airoides Herbaceous Vegetation (CEGL001778)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G2G4.

Global Comments: This association is defined by the dominance of *Pleuraphis jamesii* in the graminoid layer without codominance of other grass species or the presence of a shrub layer.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is found only in small stands near the southern boundary of the park, on Springdale West quadrangle.

Global Range: This widespread grassland association is found on alluvial flats, plateau parks and plains in the Colorado Plateau and elsewhere in the southwestern U.S.

Nations: US
States/Provinces: AZ CA CO NV UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH33, RH34
Classification Confidence: 2 **Identifier:** CEGL001777
REFERENCES: Bourgeron and Engelking 1994, Cannon 1960, Collins 1984, Driscoll et al. 1984, Francis 1986, Francis and Aldon 1983, Helm 1981, Kleiner 1968, Kleiner 1983, Kleiner and Harper 1972, Kleiner and Harper 1977, Marr et al. 1973a, Nichol 1937, Stewart et al. 1940, USFS 1937, Utah Environmental and Agricultural Consultants 1973, Weaver and Albertson 1956, West et al. 1972

V.A.5.N.k. Seasonally flooded temperate or subpolar grassland

V.A.5.N.k.42. CAREX (ROSTRATA, UTRICULATA) SEASONALLY FLOODED HERBACEOUS ALLIANCE

(Swollen-beak Sedge, Beaked Sedge) Seasonally Flooded Herbaceous Alliance

CAREX UTRICULATA HERBACEOUS VEGETATION

Beaked Sedge Herbaceous Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This wetland association is found throughout much of the western U.S. Stands occur in montane and subalpine areas around the edges of lakes and beaver ponds, along the margins of slow-moving reaches of streams and rivers, and in marshy swales and overflow channels on broad floodplains. Sites are flat to undulating, often with a hummocky microtopography. The water table is usually near the surface for most of the growing season. There are a wide variety of soil types for this association. The vegetation is characterized by a moderately dense to dense perennial graminoid layer dominated or codominated by *Carex utriculata* (20-99% cover). Stands often appear to be nearly pure *Carex utriculata*, but a variety of other graminoid species may be present as well. Other graminoid species include *Carex lenticularis*, *Carex microptera*, *Calamagrostis canadensis, Glyceria striata*, and *Juncus balticus,* but usually with low cover. The sparse forb cover can include *Geum macrophyllum, Mentha arvensis*, and *Mimulus guttatus*. Scattered *Salix* spp. shrubs may be present because these riparian shrublands are often adjacent. *Salix* species vary depending on elevation and geography.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: *Carex utriculata* Herbaceous Vegetation (CEGL001562) occurs on wide, gently sloping terrain of middle- to high-elevation plateaus. The soils of open meadow drainages that support this association are seasonally to permanently saturated.

Global Environment: This wetland association is found throughout much of the western U.S. Elevation ranges from 1060-2950 m (3500-9680 feet). Stands occur in montane and subalpine areas around the edges of lakes and beaver ponds, along the margins of slow-moving reaches of streams and rivers, and in marshy swales and overflow channels on broad floodplains (Kittel et al. 1999b). Sites are flat to undulating, often with a hummocky microtopography (Kovalchik 1993). The water table is usually near the surface for most of the growing season. There are a wide variety of soil types for this association ranging from saturated organics or fine silty clays to clays over cobbles and alluvium to fine-loamy and sandy-skeletal. Mottling and gleying often occur near the surface because of the high water table.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Carex utriculata* dominates in this association with 90% cover in Potato Hollow. *Poa pratensis* and *Pascopyrum smithii* are present on the margins of the stand.

Global Vegetation: This plant association is characterized by a moderately dense to dense perennial graminoid layer dominated or codominated by *Carex utriculata* (20-99% cover). Stands often appear to be nearly pure *Carex utriculata*, but a variety of other graminoid species may be present as well. Other *Carex* species present include *Carex lenticularis, Carex microptera, Carex nebrascensis*, and *Carex scopulorum*, but usually with low cover. Other graminoid species that may be present include *Calamagrostis canadensis, Deschampsia caespitosa, Glyceria striata*, and *Juncus balticus*. Sparse forb cover may include *Epilobium* spp., *Geum macrophyllum, Mentha arvensis, Mimulus guttatus*, and *Polemonium occidentale*. Scattered *Salix* spp. shrubs may be present because these riparian shrublands are often adjacent. *Salix* species vary depending on elevation and geography. *Salix monticola, Salix drummondiana, Salix geyeriana, Salix planifolia*, and *Salix exigua* are common species.

Global Dynamics: *Carex utriculata* is a widespread species that colonizes recently formed pond edges and seasonally flooded areas near streams. Once established it is long-lived and will dominate sites unless disturbed with changes in site hydrology. Soil development (over time) may decrease soil moisture and allow other species to replace it (Manning and Padgett 1995).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Carex utriculata*

Global

Stratum	Species
GRAMINOID	*Carex utriculata*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Carex utriculata*

Global

Stratum	Species
GRAMINOID	*Carex utriculata, Juncus spp.*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: *Carex rostrata var. utriculata* (Boott) Bailey was recognized as a distinct species from *Carex rostrata* Stokes and named *Carex utriculata* Boott (Kartesz 1999). This taxonomic change has led to confusion in some of the earlier vegetation classification literature where no distinction was made between the subspecies. *Carex utriculata* Herbaceous Vegetation (CEGL001562) is known only from the western U.S., and for now, *Carex rostrata* communities are known only from the midwestern U.S. and Canada. According to Kartesz (1999), *Carex rostrata* is reported from most of Canada, some Great Lakes states and Montana, Idaho, and Washington in the western U.S. There is significant overlap in the species ranges, and additional survey work is needed to help clarify this.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled in Potato Hollow of the Horse Pasture Plateau.

Global Range: This wetland association in found at montane and subalpine elevations throughout much of the western U.S.

Nations: US
States/Provinces: AZ? CA CO ID MT NM NV OR UT WA WY

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 96. *Carex utriculata* has not been documented in Washington County according to the Utah Flora (Welsh et al. 1987).
Classification Confidence: 1 **Identifier:** CEGL001562
REFERENCES: Andrews 1983, Baker 1983a, Benedict 1983, Bourgeron and Engelking 1994, Driscoll et al. 1984, Franklin and Dyrness 1973, Hall and Hansen 1997, Hansen et al. 1988b, Hansen et al. 1991, Hansen et al. 1995, Hess and Wasser 1982, Kartesz 1999, Kerr and Henderson 1979, Kettler and McMullen 1996, Kittel and Lederer 1993, Kittel et al. 1994, Kittel et al. 1995, Kittel et al. 1996, Kittel et al. 1999b, Kovalchik 1987, Kovalchik 1993, Looman 1982, Mattson 1984, Mutel 1973, Mutel 1976, Mutel and Marr 1973, Mutz and Graham 1982, Mutz and Queiroz 1983, Nachlinger 1985, Norton et al. 1981, Padgett 1982, Padgett et al. 1988b, Padgett et al. 1989, Ramaley 1919a, Ramaley and Robbins 1909, Schlatterer 1972, Seyer 1979, Tuhy 1981, Tuhy and Jensen 1982, Youngblood et al. 1985a, Youngblood et al. 1985b

V.A.5.N.k.56. CAREX NEBRASCENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE

Nebraska Sedge Seasonally Flooded Herbaceous Alliance

CAREX NEBRASCENSIS HERBACEOUS VEGETATION

Nebraska Sedge Herbaceous Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: These minor wetlands occur on the western Great Plains and throughout much of the western U.S. Stands form open meadows that occur along the margins of streambanks, saturated floodplains, and lakes often forming a band along the alluvial terrace. Stands have also been sampled from marshy areas surrounding springs and below seeps on lower hillslopes. This association is often found on well-developed soil, but occurs on a wide variety of soil types. Soils tend to be fine-textured alluvium, ranging from sandy, silty loam, clay loam, or clay to organic and are typically gleyed and mottled near the surface because of the high water table most of the growing season. The vegetation is characterized by a moderately dense to dense perennial graminoid layer dominated or codominated by *Carex nebrascensis* (25-99% cover), that generally forms small- to medium-sized meadows. Stands often are nearly pure *Carex nebrascensis*, but a variety of other graminoid species may be present such as *Carex praegracilis, Calamagrostis stricta, Deschampsia caespitosa, Eleocharis palustris, Glyceria striata, Juncus balticus, Schoenoplectus pungens (= Scirpus pungens)*, or *Triglochin maritima*. Forb cover is generally low, but can be high in moist locations. Common forbs include *Eurybia integrifolia (= Aster integrifolius), Geum macrophyllum, Mentha arvensis, Mimulus glabratus*, and *Ranunculus cymbalaria*. Introduced species *Poa pratensis, Poa palustris*, and *Melilotus officinalis* may also be common.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: This vegetation association occurs on gently sloping drainages on the park's high-elevation plateaus. Slopes are less than 5% and have south and southeast aspects. Clay soils impede rapid moisture infiltration and are seasonally to permanently saturated.

Global Environment: This wetland plant association occurs on the western Great Plains and throughout much of the western U.S. Elevation ranges from 1000-2800 m (3300-9200 feet). Stands form open meadows that occur along the margins of streambanks, flat floodplains, and lakes often forming a band along the alluvial terrace. Stands have also been sampled from marshy areas surrounding springs and below seeps on lower hillslopes. This association is often found on well-developed soil, but occurs on a wide variety of soil types ranging from saturated organics to Mollisols to Entisols. Soils tend to be fine-textured alluvium, ranging from sandy, silty loam, clay loam, or clay to organic and are typically gleyed and mottled near the surface because of the high water table most of the growing season.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Carex nebrascensis* Herbaceous Vegetation (CEGL001813) forms nearly homogeneous stands of 80% foliar cover. Wetland species *Juncus balticus* and *Poa pratensis* contribute to the dense, nearly 100%, total foliar cover. Heterogeneous stands of *Carex nebrascensis* occur around springs and ponds in the park, maintaining dominance at 20% cover. *Agrostis stolonifera, Equisetum arvense*, and *Trifolium longipes* are major contributors to the dense foliar cover of this wetland association. *Carex microptera, Typha angustifolia, Juncus ensifolius, Juncus tenuis, Eleocharis* spp., *Juncus longistylis, Achillea millefolium, Rumex acetosella*, and *Mentha arvensis* are also present in the sampled stand.

Global Vegetation: These wetlands are characterized by a moderately dense to dense perennial graminoid layer dominated or codominated by *Carex nebrascensis* (25-99% cover), that generally forms small- to medium-sized meadows. Stands often are nearly pure *Carex nebrascensis*, but a variety of other graminoid species may be present such as *Carex praegracilis, Calamagrostis stricta, Deschampsia caespitosa, Eleocharis palustris, Glyceria striata, Juncus balticus, Schoenoplectus pungens (= Scirpus pungens)*, or *Triglochin maritima*. Forb cover is generally low, but can be high in moist locations. Common forbs include *Eurybia integrifolia (= Aster integrifolius), Geum macrophyllum, Mentha arvensis, Mimulus glabratus*, and *Ranunculus cymbalaria*. Introduced species *Poa pratensis, Poa palustris*, and *Melilotus officinalis* may also be common.

In Nebraska, common species include *Agrostis stolonifera, Carex hystericina, Carex pellita (= Carex lanuginosa), Eleocharis erythropoda, Equisetum* spp., *Juncus balticus, Schoenoplectus pungens (= Scirpus pungens)*, and *Triglochin* spp. (Steinauer and Rolfsmeier 2000).

Global Dynamics: In Montana, the *Carex nebrascensis* Community Type is considered a grazing-disclimax. Under season-long grazing, *Carex nebrascensis* increases in abundance, replacing former dominant species (Hansen et al. 1995). However, under extreme grazing conditions and a resulting drop in the water table, *Juncus balticus* or *Poa pratensis* can eventually replace *Carex nebrascensis*. In Nevada (and probably Colorado), sites dominated by *C. nebrascensis* are considered a Potential Natural Community (Manning and Padgett 1995).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Agrostis stolonifera, Carex microptera, Carex nebrascensis, Juncus balticus, Juncus ensifolius Juncus longistylis , Typha angustifolia*
FORB	*Equisetum arvense, Trifolium longipes*

Global

Stratum	Species
GRAMINOID	*Agrostis stolonifera, Carex nebrascensis, Juncus balticus*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Agrostis stolonifera, Carex nebrascensis, Juncus balticus*
FORB	*Equisetum arvense*

Global

Stratum	Species
GRAMINOID	*Agrostis stolonifera, Carex nebrascensis, Juncus balticus*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G4.

Global Comments: In the Black Hills, classification of stands was problematic due to identification problems with *Carex nebrascensis* and *Carex aquatilis*. The two are difficult to distinguish based on available keys and written descriptions (Marriott and Faber-Langendoen 2000).

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled on Horse Ranch Mountain and the Upper Kolob Plateau in Zion National Park.

Global Range: This sedge meadow type is widely distributed from the western Great Plains into the western mountains of the United States, ranging from South Dakota and Montana to possibly as far west as Washington, south to California and east to New Mexico.

Nations: US
States/Provinces: AZ CA CO ID MT NE NM? NV OR SD UT WA? WY

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 113, 134
Classification Confidence: 1 **Identifier:** CEGL001813
REFERENCES: Baker 1982b, Bourgeron and Engelking 1994, Cooper and Cottrell 1990, Driscoll et al. 1984, Hall 1973, Hall and Hansen 1997, Hansen et al. 1988b, Hansen et al. 1991, Hansen et al. 1995, Jones 1992b, Jones and Walford 1995, Kittel et al. 1994, Kittel et al. 1996, Kittel et al. 1999, Kittel et al. 1999b, Kovalchik 1987, Manning and Padgett 1995, Marriott and Faber-Langendoen 2000, Mutz and Queiroz 1983, Padgett et al. 1988b, Padgett et al. 1989, Steinauer and Rolfsmeier 2000, Youngblood et al. 1985a, Youngblood et al. 1985b.

V.A.5.N.k.13. JUNCUS BALTICUS SEASONALLY FLOODED HERBACEOUS ALLIANCE

Baltic Rush Seasonally Flooded Herbaceous Alliance

JUNCUS BALTICUS HERBACEOUS VEGETATION

Baltic Rush Herbaceous Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This Baltic rush wet meadow community is found widely throughout the western United States. This wet meadow vegetation occurs as small, dense patches on flat stream benches, along overflow channels, and near springs. Soils are variable and range from poorly to well-drained, sandy clay loam to fine sand-textured and are usually mottled or gleyed. Stands are characterized by a dense sward of *Juncus balticus* and often minor cover of *Carex* species, including *Carex aquatilis, Carex praegracilis, Carex nebrascensis*, or *Carex utriculata*. Other common species include *Deschampsia caespitosa, Distichlis spicata, Glyceria striata, Hordeum jubatum, Muhlenbergia asperifolia, Phleum alpinum*, and *Sporobolus airoides*. The introduced perennial sod grasses *Poa pratensis* or *Agrostis stolonifera* codominate some stands. Forb cover is generally low and includes wetland species like *Caltha leptosepala* and *Dodecatheon pulchellum*. Shrubs are not common. This association is often considered to be a grazing-induced community since it increases with disturbance.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: This association is positioned between stream channel dams and natural wetland sites. Soil is a clay loam and litter cover is high.

Global Environment: This widespread herbaceous wetland community is found throughout western North America. Elevation ranges from 1420-3500 m. Stands usually occur as small, dense patches on flat to gently sloping sites near seeps and streams. Stream channels are highly variable in size and type ranging from narrow to moderately wide, and deeply entrenched to very sinuous (Kittel et al. 1999b). Soils are also variable and range from alluvial sandy and well-drained, to poorly drained silty clay loam, to organic; however, soils tend to be finer-textured, alkaline and may be saline (Brotherson and Barnes, Kittel et al. 1999b, Padgett et al. 1989). Cobbles and gravel are common on many sites, and gleyed and mottled horizons are often present because of flooding or high water tables (Kittel et al. 1999b).

VEGETATION DESCRIPTION

Zion National Park Vegetation: One documented stand of *Juncus balticus* has cover of 90%. Traces of *Poa pratensis* and *Pascopyrum smithii* are found at the stand margins. *Convolvulus arvensis*, a prostrate vine, trails through the stand. Other sampled stands are heterogeneous. *Juncus balticus* dominates or codominates with an array of mesic graminoid species, including *Juncus tenuis, Juncus longistylis, Carex microptera, Carex occidentalis, Agrostis stolonifera*, and *Poa pratensis*.

Global Vegetation: This association is characterized by a low (<50 cm), dense graminoid layer dominated by the rhizomatous perennial *Juncus balticus*. Minor cover of *Carex* species, including *Carex aquatilis, Carex praegracilis, Carex nebrascensis* or *Carex utriculata*, is often present. Other common graminoids include *Deschampsia caespitosa, Distichlis spicata, Glyceria striata, Hordeum jubatum, Muhlenbergia asperifolia, Phleum alpinum*, and *Sporobolus airoides*. Forb cover is generally low, but may include *Caltha leptosepala, Glaux maritima, Maianthemum stellatum*, and *Dodecatheon pulchellum*. Shrubs are not common, however occasional *Salix* spp. may occur. Some stands may be codominated by the introduced perennial sod grasses *Poa pratensis* or *Agrostis stolonifera*. Other introduced species, such as *Taraxacum officinale, Trifolium* spp., *Cirsium arvense, Lactuca serriola, Phleum pratense*, and *Thinopyrum intermedium*, may occur in disturbed stands.

Global Dynamics: This association is considered by some to be a grazing-induced community because *Juncus balticus* is tolerant of grazing (low palatability when mature) and increases with grazing disturbance (Hansen et al. 1995, Padgett et al. 1989). Nearly pure stands of *Juncus balticus* may indicate that the site was heavily grazed in the past (Hansen et al. 1995). However, this association also occurs as a stable, late-seral community in areas with low disturbance (Kittel and Lederer 1993).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Agrostis stolonifera, Carex microptera, Carex occidentalis, Juncus balticus, Poa pratensis*

Global

Stratum	Species
GRAMINOID	*Carex nebrascensis, Carex praegracilis, Juncus balticus*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Juncus balticus*

Global

Stratum	Species
GRAMINOID	*Juncus balticus*

GLOBAL SIMILAR ASSOCIATIONS:

- Eleocharis palustris - Juncus balticus Herbaceous Vegetation (CEGL001835)
- Juncus balticus - Carex rossii Herbaceous Vegetation (CEGL001839)

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G5.

Global Comments: This association is often considered to be a grazing-induced community since it increases with grazing disturbance.

ELEMENT DISTRIBUTION

Zion National Park Range: *Juncus balticus* occurs in a mosaic pattern with other wetland vegetation along streams, ponds, meadows, seeps and springs in Zion National Park. The stand sampled on the East Rim along the eastern boundary of the park is a uniquely homogeneous. Similar stands are likely scattered infrequently across the northern regions of the park. Other more heterogeneous stands have been documented in the northern region.

Global Range: This Baltic rush wet meadow community is found widely throughout the western United States, ranging from South Dakota and Montana west to Washington, south to possibly California, and east to New Mexico.

Nations: US
States/Provinces: CA? CO ID MT NM NV OR SD UT WA WY

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 51, 61, 67
Classification Confidence: 1 **Identifier:** CEGL001838
REFERENCES: Baker 1984a, Bourgeron and Engelking 1994, Brotherson and Barnes 1984, Bunin 1985, Driscoll et al. 1984, Faber-Langendoen 2001, Flowers 1962, Hall and Hansen 1997, Hansen et al. 1988b, Hansen et al. 1991, Hansen et al. 1995, Hess 1981, Johnston 1987, Jones and Walford 1995, Kartesz 1994, Kittel and Lederer 1993, Kittel et al. 1994, Kittel et al. 1999, Kittel et al. 1999b, Komarkova 1986, Manning 1988, Muldavin et al. 2000a, Mutel 1973, Mutz and Graham 1982, Olson and Gerhart 1982, Padgett 1982, Padgett et al. 1989, Rector 1979, Richard et al. 1996, Shupe et al. 1986, Stewart 1940, Tuhy and Jensen 1982, Wasser and Hess 1982, Youngblood et al. 1985a

V.A.5.N.k.21. POA PRATENSIS SEMI-NATURAL SEASONALLY FLOODED HERBACEOUS ALLIANCE

Kentucky Bluegrass Semi-natural Seasonally Flooded Herbaceous Alliance

POA PRATENSIS SEMI-NATURAL SEASONALLY FLOODED HERBACEOUS ALLIANCE

Kentucky Bluegrass Semi-natural Seasonally Flooded Herbaceous Alliance

ELEMENT CONCEPT

GLOBAL SUMMARY: This semi-natural grassland is widespread in the western U.S. and northern Great Plains where it has invaded natural meadows and riparian areas. Sites are generally flat to moderately sloping and occur on all aspects. Stands typically occur on pastures found in the plains, montane meadows, stream benches and terraces. In the semi-arid region it is restricted to relatively mesic sites. Soils are highly variable, but *Poa pratensis* grows best on moist, fertile sandy to clayey alluvium with high organic content. It does not tolerate prolonged flooding, high water tables or poor drainage well. However, it can tolerate mildly alkaline and saline soils, and some drought. The vegetation is characterized by a moderate to dense herbaceous canopy that is strongly dominated by the introduced perennial, sod-forming graminoid *Poa pratensis*. *Poa pratensis* has invaded many natural plant associations, but the diagnostic character in this association is that there is typically not enough of the native grassland left to classify it as a poor condition natural type. Associates are often those early-seral and weedy species that tolerate the historic heavy livestock grazing or other disturbance well, such as *Achillea millefolium, Cirsium arvense, Elymus repens, Equisetum* spp., *Fragaria virginiana, Hordeum* spp., *Juncus balticus, Linaria vulgaris, Potentilla gracilis, Taraxacum officinale*, and introduced forage species such as *Agrostis stolonifera, Bromus inermis*, and *Phleum pratense*. Remnant natives *Pascopyrum smithii, Deschampsia caespitosa*, and *Carex* spp. are often present in low cover. Occasional trees and shrubs may also be present.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: This association occurs on gently sloping meadows of valleys and plateaus at elevations from 5700-8000 feet. Soil texture is clay or sandy loam.

Global Environment: This semi-natural grassland is widespread in the western U.S. and northern Great Plains where it has invaded natural prairies, meadows and riparian areas. Elevation ranges from 1100-2625 m (3600-8600 feet). Sites are generally flat to moderately sloping and occur on all aspects. Stands typically occur on pastures found in the plains, montane meadows, stream benches and terraces. In the semi-arid regions it is restricted to relatively mesic sites. Soils are variable, but *Poa pratensis* grows best on moist, fertile sandy to clayey alluvium with high organic content (Hansen et al. 1995). It does not tolerate prolonged flooding, high water tables or poor drainage well. However, it can tolerate mildly alkaline and saline soils, and some drought (Hansen et al. 1995, Hall and Hansen 1997, Kovalchik 1987, Manning and Padgett 1995, Padgett 1989).

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association is dominated by *Poa pratensis* with a cover of 50-80%. Other herbaceous species present in the three stands sampled are *Elymus lanceolatus, Achnatherum lettermanii, Elymus elymoides*, and *Bromus tectorum* on drier sites, and *Bromus inermis, Equisetum arvense, Agrostis stolonifera, Achillea millefolium, Trifolium longipes, Medicago lupulina, Trifolium longipes, Taraxacum officinale*, and *Tragopogon dubius* on wetter sites. These species contribute 5-20% additional cover. Herbaceous litter covers most of the bare ground. Montane woodlands and oak shrublands occur on the surrounding uplands.

Global Vegetation: This widespread, semi-natural plant association is characterized by a moderate to dense herbaceous canopy that is strongly dominated by the introduced perennial, sod-forming graminoid *Poa pratensis*. *Poa pratensis* has invaded many natural plant associations, but the diagnostic character in this association is that there is typically not enough of the native grassland left to classify it as a poor condition natural type. Associates are often those early-seral and weedy species that tolerate the historic heavy livestock grazing or other disturbance well, such as *Achillea millefolium, Cirsium arvense, Elymus repens, Equisetum* spp., *Fragaria virginiana, Hordeum* spp., *Juncus balticus, Linaria vulgaris, Potentilla gracilis, Taraxacum officinale*, and introduced forage species such as *Agrostis stolonifera, Bromus inermis*, and *Phleum pratense*. Remnant natives *Pascopyrum smithii, Deschampsia caespitosa*, and *Carex* spp. are often present in low cover. Occasional trees and shrubs may also be present.

At Wind Cave National Park in South Dakota, stands typically have moderate to dense herbaceous cover, ranging from 50-100%, and *Poa pratensis* contributes at least 75% of that cover. Other common herbaceous species include *Artemisia ludoviciana, Psoralidium tenuiflorum*, and *Ambrosia psilostachya*. *Andropogon gerardii* may be present, with high coverage in wetter seasons. On steeper slopes, it is not uncommon to find significant amounts of *Amorpha canescens* cover greater than 20% (H. Marriott pers. comm. 1999).

Global Dynamics: *Poa pratensis* is widespread in the western U.S. where, following disturbance, its extensive rhizome system allows it to spread and establish, outcompeting many native graminoids. It is tolerant of heavy grazing and increases at the expense of less tolerant native species (Hansen et al. 1995, Volland 1978). It is also adapted to burning and quickly resprouts after fire, except when burned during growing periods (Volland and Dell 1981).

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Bromus inermis, Elymus lanceolatus, Poa pratensis*
FORB	*Achillea millefolium, Medicago lupulina, Trifolium longipes*
FERN	*Equisetum arvense*

Global

Stratum	Species
GRAMINOID	*Poa pratensis*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Poa pratensis*

Global

Stratum	Species
GRAMINOID	*Poa pratensis*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: GW.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs in Pine Valley, Hop Valley, Kolob Canyons and near Lava Point in Zion National Park. All these locations are in the northern region of the park.

Global Range: This semi-natural grassland is widespread in the western U.S. and northern Great Plains.

Nations: US
States/Provinces: CA ID MT OR UT WA WY

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 62, 78
Classification Confidence: 2 **Identifier:** CEGL003081
REFERENCES: Franklin and Dyrness 1973, Hall and Hansen 1997, Hansen et al. 1995, Kauffman et al. 1983, Kauffman et al. 1985, Kovalchik 1987, Manning and Padgett 1995, Padgett et al. 1989, Sawyer and Keeler-Wolf 1995, Tuhy and Jensen 1982, Volland 1978, Volland and Dell 1981, Youngblood et al. 1985a

V.A.7.N.e. Medium-tall temperate or subpolar grassland with a sparse needle-leaved or microphyllous evergreen shrub layer

V.A.7.N.e.4. CHRYSOTHAMNUS VISCIDIFLORUS SHRUB HERBACEOUS ALLIANCE

Green Rabbitbrush Shrub Herbaceous Alliance

CHRYSOTHAMNUS VISCIDIFLORUS / POA PRATENSIS SEMI-NATURAL SHRUB HERBACEOUS VEGETATION [PROVISIONAL]

Green Rabbitbrush / Kentucky Bluegrass Semi-natural Shrub Herbaceous Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on a gently sloping meadow drainage at 7200 feet. Soil texture is loamy.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This association was documented once in Zion National Park. This stand is a couple acres in size and is slightly upland from the valley's stream channel and wetland vegetation. *Chrysothamnus viscidiflorus* and *Poa pratensis* codominate, both having 50% cover. Other stands of this size are not expected to occur elsewhere in the park.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHRUB	*Chrysothamnus viscidiflorus*
GRAMINOID	*Poa pratensis*
FORB	*Lupinus argenteus*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHRUB	*Chrysothamnus viscidiflorus*
GRAMINOID	*Poa pratensis*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is located along the Wildcat Canyon Trail of the Lower Kolob Plateau of the park.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 60
Classification Confidence: 2 **Identifier:** CEGL002933
REFERENCES: None available.

V.B.2.N.e. Semipermanently flooded temperate perennial forb vegetation

V.B.2.N.e.400. EQUISETUM (ARVENSE, VARIEGATUM) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

(Field Horsetail, Variegated Scouringrush) Semipermanently Flooded Herbaceous Alliance

EQUISETUM (ARVENSE, VARIEGATUM) HERBACEOUS VEGETATION

(Field Horsetail, Variegated Scouringrush) Herbaceous Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This wetland association is reported from Utah and Ontario, Canada, but its distribution is much broader. If its range is similar to the ranges of dominant and diagnostic species, then it likely occurs throughout much of northern and western North America. Sites include streambanks, wet meadows and ditches. Substrates are generally organic alluvium. This community is typically flooded much of the growing season. The water table is high even when surface water is gone. The vegetation is characterized by the moderately dense to dense herbaceous layer that is dominated or codominated by *Equisetum arvense* or *Equisetum variegatum*. Other wetland and facultative wetland plants may be present in low cover, but the dominance of *Equisetum* spp. is diagnostic of this type. Introduced graminoids such as the perennial *Poa pratensis* or the annual *Bromus diandrus* are known to codominate some stands.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Zion National Park Environment: This association occurs on gently sloping streambanks. Elevation for the documented stands of *Equisetum* spp. ranges 4000-5800 feet, but stands may occur at higher elevations in the park. The terrain is flat, and soils are moist from the proximity to the river. Soils are loamy sand and completely covered with litter/duff.

Global Environment: This wetland association is reported from Utah and Ontario, Canada, but the distribution is much broader. If its range is similar to the ranges of dominant and diagnostic species, then it likely occurs throughout much of northern and western North America. Sites include streambanks, wet meadows and ditches. Substrates are generally organic alluvium. This community is typically flooded much of the growing season. The water table is high even when surface water is gone.

VEGETATION DESCRIPTION

Zion National Park Vegetation: This herbaceous association is codominated by the introduced sod grass *Poa pratensis* and *Equisetum arvense or Equisetum variegatum.* The sampled stands had 10-70% combined cover of these species. Other species present in documented stands were *Bromus diandrus, Medicago lupulina, Tradescantia occidentalis*, and *Machaeranthera canescens*. Two unknown forbs are abundant in the stand.

Global Vegetation: This wetland association is characterized by the moderately dense to dense herbaceous layer that is dominated or codominated by *Equisetum arvense* or *Equisetum variegatum*. Other wetland and facultative wetland plants may be present in low cover, but the dominance or codominance of *Equisetum* spp. is diagnostic of this type. Introduced graminoids such as the perennial *Poa pratensis* or the annual *Bromus diandrus* are known to codominate some stands.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Poa pratensis*
FERN	*Equisetum arvense, Equisetum variegatum*

Global

Stratum	Species
GRAMINOID	*Equisetum arvense, Equisetum variegatum, Poa pratensis*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
FERN	*Equisetum arvense, Equisetum variegatum*

Global

Stratum	Species
GRAMINOID	*Equisetum arvense, Equisetum variegatum*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Type was established to accommodate southern Ontario vegetation types listed in Lee et al. (1998). This association may have been largely overlooked because of its small scale or included with other vegetation types.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is documented in Zion Canyon and Hop Valley, and occurs in less than 0.5-hectare stands along other canyon streams in the park.

Global Range: Documented from only Utah and Ontario, Canada, these wetlands likely occur throughout much of northern and western North America.

Nations: CA US
States/Provinces: ON UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH67, 78
Classification Confidence: 3 **Identifier:** CEGL005148
REFERENCES: Hauke 1993, Larson 1993, Lee et al. 1998

V.D.2.N.d. Short temperate annual grassland

V.D.2.N.d.2. BROMUS TECTORUM SEMI-NATURAL HERBACEOUS ALLIANCE

Cheatgrass Semi-natural Herbaceous Alliance

BROMUS TECTORUM SEMI-NATURAL HERBACEOUS ALLIANCE

Cheatgrass Herbaceous Semi-natural Alliance

ELEMENT CONCEPT

GLOBAL SUMMARY: This alliance-level herbaceous vegetation type is found throughout much of western North America from the western Great Plains to Intermountain West. It occurs after disturbance of a natural shrub- or grass-dominated community that results in the replacement of the natural vegetation by non-native, annual grass species of *Bromus*. *Bromus tectorum* typically dominates the community with over 80-90% of the total vegetation cover, making it difficult to determine what natural community was formerly present. This alliance also includes grasslands dominated or codominated by other Eurasian introduced annual *Bromus* species such as *Bromus hordeaceus, Bromus madritensis, Bromus japonicus, Bromus rigidus*, or *Bromus rubens*. It is distinct from the annual *Bromus* communities found along the Pacific Coast typical of the Mediterranean or maritime climates.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: *Bromus tectorum* Semi-natural Herbaceous Alliance (CEGL003019) was observed in low-lying sites, washes and river floodplains, and dry meadows in upland areas. These sites are highly disturbed from human recreational use, past livestock grazing and cultivation.

Global Environment: This alliance-level herbaceous vegetation type is found throughout much of western North America from the western Great Plains to intermountain and southwestern U.S. Elevation ranges from sea level to 2200 m. Stands occur after disturbance of a natural shrub- or grass-dominated community resulting in the replacement of the natural vegetation by non-native, annual grass species of *Bromus*. At Wind Cave National Park in South Dakota, weedy non-native graminoid vegetation occurs on recently disturbed areas, most commonly along roads. Small stands also occur in prairie dog towns (H. Marriott pers. comm. 1999). In the Great Basin, *Bromus tectorum* grasslands has invaded large areas of burned-over sagebrush steppe. *Bromus tectorum* increases the fire frequency of steppe communities, which eventually eliminates sagebrush (FEIS 2001).

VEGETATION DESCRIPTION

Zion National Park Vegetation: This alliance is dominated by *Bromus tectorum*. Other species present are most commonly exotic forbs and agricultural grasses.

Global Vegetation: This alliance-level vegetation type is characterized by a sparse to dense short annual graminoid layer that is typically dominated by *Bromus tectorum* with over 80-90% of the total vegetation cover. Other Eurasian introduced annual species of *Bromus* which may alternatively dominate or codominate are *Bromus carinatus, Bromus hordeaceus, Bromus madritensis, Bromus japonicus, Bromus rigidus*, or *Bromus rubens*. Although there may be remnant species of the former native vegetation, the high cover of annual bromes makes it difficult to determine what natural community was formerly present. At Wind Cave National Park in South Dakota, this weedy non-native graminoid vegetation is usually dominated by several perennial and annual brome grasses, including *Bromus inermis, Bromus japonicus*, and cheatgrass *Bromus tectorum*. Cover is variable (H. Marriott pers. comm. 1999).

Global Dynamics: *Bromus tectorum* is an annual grass and is able to complete its lifecycle in the spring before drying out mid-summer. Its fine structure makes it extremely flammable when dry, and it will increase the fire frequency of a site (FEIS 2001). Frequent fires favor *Bromus tectorum* because they eliminate competing perennial vegetation, but do not kill all the *Bromus tectorum* seeds, which survive in the unburned organic material (FEIS 2001). This altered ecological process has promoted the spread of *Bromus tectorum* and other exotic annual bromes at the expense of sagebrush shrublands in large parts of the western U.S. (Daubenmire 1975, Young and Evans 1973, 1978).

This type is most common where disturbances have eliminated or largely set back the native vegetation. Where the brome grasses are invading native vegetation, the types may still be tracked as native types, since the native species may still persist. A recent study (Karl et al. 1999) found that despite strong seed and seedling production by the exotic brome grasses (*Bromus japonicus, Bromus tectorum*), the large amount of herbaceous biomass produced by the two vegetatively propagating native grasses, *Bouteloua gracilis* and *Pascopyrum smithii*, suggests that these native grasses may well maintain their ecological importance in the stands.

In Nevada, Beatley (1976) found dense stands the introduced winter annual grass *Bromus tectorum* growing in disturbed *Artemisia* shrublands. *Bromus rubens* is more common in lower elevation sites, and *Bromus tectorum* is most common in higher elevation sagebrush and pinyon-juniper communities.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Bromus tectorum*

Global

Stratum	Species
GRAMINOID	*Bromus tectorum, Bromus hordeaceus, Bromus madritensis, Bromus japonicus, Bromus rigidus*, *Bromus rubens*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
GRAMINOID	*Bromus tectorum*

Global

Stratum	Species
GRAMINOID	*Bromus tectorum, Bromus hordeaceus, Bromus madritensis, Bromus japonicus, Bromus rigidus*, *Bromus rubens*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: GW.

Global Comments: This alliance also includes grasslands dominated or codominated by other Eurasian introduced annual *Bromus* species. It is distinct from the annual *Bromus* communities found along the Pacific Coast with Mediterranean or maritime climates because it does not have the introduced annual oatgrass (*Avena barbata* and *Avena fatua*), or other species typical of the California annual grassland (Sawyer and Keeler-Wolf 1995).

ELEMENT DISTRIBUTION

Zion National Park Range: No plots were taken for this vegetation type. It was observed in disturbed areas of Zion National Park at lower elevations and a variety of landforms, but is more common in lowlands, old agriculture fields and overgrazed pastures. This alliance is extensive in Main Canyon, Parunaweep Canyon, and Upper Coalpits.

Global Range: This alliance-level herbaceous vegetation type is found throughout much of western North America from the western Great Plains to intermountain and southwestern U.S.

Nations: US
States/Provinces: AZ CA UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: None. AA plots: Yes
Classification Confidence: 2 **Identifier:** CEGL003019
REFERENCES: Beatley 1976, Daubenmire 1975, FEIS 2001, Karl et al. 1999, Sawyer and Keeler-Wolf 1995, Young and Evans 1973, Young and Evans 1978

VII. SPARSE VEGETATION

VII.A.1.N.a. Cliffs with sparse vascular vegetation

VII.A.1.N.a.200. WOODED BEDROCK SPARSELY VEGATATED ALLIANCE

Wooded Bedrock Sparsely Vegetated Alliance

PINUS PONDEROSA SLICKROCK SPARSE VEGETATION

Ponderosa Pine Slickrock Sparse Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on steep Navajo sandstone slopes above 6000 feet elevation. Sandy soils accumulate in rock crevices to support opportunistic vegetation. There is high cover of exposed bedrock.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Plant species cover in these stands that occupy Navajo sandstone slopes are too sparse to classify them as woodland, shrublands or grasslands. Cover of *Pinus ponderosa* is between 5-20% and usually less than 15% cover. Other tree species may include *Pinus edulis, Pinus monophylla,* and/or *Juniperus osteosperma*. *Pinus ponderosa* trees typically have stunted growth, with heights averaging 10 m or less. Shrubs that commonly occur are *Arctostaphylos patula, Amelanchier utahensis, Quercus turbinella*, and *Cercocarpus intricatus*. Cover of shrubs is less than tree cover. The herbaceous layer is very sparse and inconsistent in composition. Even with the sparse vegetation cover, species composition may be relatively diverse, e.g., 27 species were recorded from one plot.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Pinus ponderosa, Pinus monophylla*
TALL SHRUB	*Amelanchier utahensis, Arctostaphylos patula, Cercocarpus intricatus*
GRAMINOID	*Aristida purpurea, Poa fendleriana, Sporobolus cryptandrus*
FORB	*Comandra umbellata, Heterotheca villosa, Phlox austromontana, Stephanomeria spp.*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
TREE CANOPY	*Pinus ponderosa*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs frequently on Navajo sandstone formations of the eastern side of Zion National Park and Kolob Canyons region.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH26, 127
Classification Confidence: 3 **Identifier:** CEGL002972
REFERENCES: None available.

VII.A.2.N.a. Pavement with sparse vascular vegetation

VII.A.2.N.a.200. CERCOCARPUS INTRICATUS SPARSELY VEGETATED ALLIANCE

Littleleaf Mountain-mahogany Sparsely Vegetated Alliance

CERCOCARPUS INTRICATUS SLICKROCK SPARSE VEGETATION

Littleleaf Mountain-mahogany Slickrock Sparse Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: The Navajo sandstone slopes where this association occurs are usually steep with various aspects. Where vegetation exists on these slopes, soils are sandy and shallow. Bedrock makes up 85-100% of ground cover.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Cercocarpus intricatus* dominates this association, but only averages 5-10% cover. Other shrubs commonly contributing to the sparse cover include *Arctostaphylos patula, Quercus turbinella, Amelanchier utahensis*, and *Yucca* spp. *Pinus edulis, Pinus monophylla, Juniperus osteosperma*, and *Pinus ponderosa* may be represented as few singular trees across the landscape. Herbaceous species present are diverse, inconsistent in composition, and very sparse. The common species that occur are *Heterotheca villosa, Arenaria fendleri, Sporobolus cryptandrus, Poa fendleriana*, and *Aristida purpurea*.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHRUB	*Cercocarpus intricatus*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHRUB	*Arctostaphylos patula, Cercocarpus intricatus, Quercus turbinella, Yucca* spp.

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs extensively on the sandstone slopes of Springdale East quadrangle and less frequently in the Kolob Arch quadrangle.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH29, 5, 20, 107, 128, 250, 253
Classification Confidence: 2 **Identifier:** CEGL002977
REFERENCES: None available.

VII.C.3.N.b. Dry slopes

VII.C.3.N.b.200. CERCOCARPUS MONTANUS SPARSELY VEGETATED ALLIANCE

Mountain-mahogany Sparsely Vegetated Alliance

CERCOCARPUS MONTANUS ROCK PAVEMENT SPARSE VEGETATION

Mountain-mahogany Rock Pavement Sparse Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on gentle to steep mesa rims and mountain ridges where most of the exposed ground is rock pavement or high cover of small and large rock fragments. Soils are sandy or silty. Elevation ranges 6700 to 8200 feet.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Total shrub cover in this association is between 5 and 20%. *Cercocarpus montanus* usually dominates or codominates the shrub component with various combinations of *Amelanchier utahensis, Arctostaphylos patula*, and/or *Quercus gambelii*. *Cercocarpus montanus* was not present in one stand; however, the rest of the species composistion was consistent. Single standing *Juniperus osteosperma* and *Pinus edulis* may be found in the stand. Little bare ground is exposed and is usually entirely covered with small to large rock fragments forming a rock pavement. Few herbaceous species are present and they are extremely sparse in cover.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHRUB	*Amelanchier utahensis, Arctostaphylos patula, Cercocarpus montanus, Quercus gambelii*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHRUB	*Amelanchier utahensis, Arctostaphylos patula, Cercocarpus montanus*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs on mesa rims and mountain ridges in the northern regions of the park. Goose Creek knoll and the western rim of Horse Ranch Mountain are representative sites.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 102, 115, 213, 309
Classification Confidence: 3 **Identifier:** CEGL002978
REFERENCES: None available.

VII.C.3.N.b.201. PAINTED DESERT SPARSELY VEGETATED ALLIANCE

Painted Desert Sparsely Vegetated Alliance

EPHEDRA NEVADENSIS / LICHEN SPARSE VEGETATION [PROVISIONAL]

Nevada Joint-fir / Lichen Sparse Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on the top of small alluvium hills on the Virgin River valley floor. Elevation is approximately 3800 feet, and soils are white in color and silty in texture. Ground cover is 85% cryptogamic crust.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Total vegetation cover for this association is less than 5%. Cryptogamic crust constitutes 85% of the ground cover, *Ephedra nevadensis* 3% foliar cover, *Atriplex canescens* 1%, and *Bromus tectorum* 1%.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHRUB	*Ephedra nevadensis*
GRAMINOID	*Bromus tectorum*
NONVASCULAR	Unknown lichen species

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHRUB	*Atriplex canescens, Ephedra nevadensis*
NONVASCULAR	Unknown lichen species

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association occurs east of Coalpits Wash at the southern boundary of the park. It may occur very infrequently in small stands along the southern and western boundary of the park.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH45
Classification Confidence: 3 **Identifier:** CEGL002976
REFERENCES: None available.

ERIOGONUM CORYMBOSUM BADLANDS SPARSE VEGETATION

Crispleaf Wild Buckwheat Badlands Sparse Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: Elevation for this association and most of the Chinle Formation is 4000 to 4300 feet. Slopes are generally steep, and vegetation has difficulty taking hold on the highly erosive silty clay soil. Chinle is a shale formation from the Triassic period colored in mauve, gray and white, and weathering to clay on exposure.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Vegetation is extremely sparse for this association, less than 20% total canopy cover of vascular plants. All species that occur contribute minimal cover. Those species that regularly occur are *Eriogonum corymbosum, Atriplex confertifolia, Ericameria nauseosa, Psorothamnus fremontii, Salvia dorrii, Gutierrezia sarothrae, Coleogyne ramosissima, Pleuraphis jamesii*, and *Elymus elymoides*.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Atriplex confertifolia, Eriogonum corymbosum, Ericameria nauseosa*
GRAMINOID	*Bromus tectorum, Elymus elymoides, Pleuraphis jamesii*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHORT SHRUB	*Atriplex confertifolia, Eriogonum corymbosum*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association is documented on the southern boundary of the park near Shunesburg. In the park, the Chinle Formation, for the most part, extends north from Rockville into the uplands of Scoggins Wash. It appears again in scattered locations to the northwestern region of the park. This association is likely to occur on other eroded Chinle sites.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH86, 4
Classification Confidence: 3 **Identifier:** CEGL002979
REFERENCES: None available.

Xx. HIERARCHY PLACEMENT UNDETERMINED

BACCHARIS EMORYI SHRUBLAND [PROVISIONAL]

Emory Seepwillow Shrubland

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association occurs on flat streambanks or stream terraces. Soils are sandy.

Global Environment: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

VEGETATION DESCRIPTION

Zion National Park Vegetation: *Baccharis emoryi* has 35-45% cover in the shrub layer. *Salix exigua* may be present but with less than 5% cover. Tree species, if present, are saplings. Some herbaceous species of minimal cover present include *Equisetum variegatum, Melilotus officinalis, Salsola tragus, Muhlenbergia asperifolia*, and *Poa pratensis*. This association occurs in a mosaic amongst mature *Populus fremontii - Fraxinus velutina* Woodland in Zion Canyon.

Global Vegetation: This association has only been described from Zion NP. Until further inventory is completed there is no global information.

Global Dynamics: Information not available.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHRUB	*Baccharis emoryi*

Global

Stratum	Species
Information not available.	

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHRUB	*Baccharis emoryi*

Global

Stratum	Species
Information not available.	

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: Information not available.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled in Zion Canyon on the banks of the Virgin River. It has been observed in small stands along the banks of the Virgin River and the East Fork of the Virgin River.

Global Range: This association has currently only been described from Zion NP in southwestern Utah.

Nations: US

States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: RH68
Classification Confidence: 3 **Identifier:** CEGL002974
REFERENCES: None available.

ERICAMERIA NAUSEOSA SAND DEPOSIT SPARSE VEGETATION [PROVISIONAL]

Rubber Rabbitbrush Sand Deposit Sparse Vegetation

ELEMENT CONCEPT

GLOBAL SUMMARY: This association has only been described from Zion National Park and Ouray National Wildlife Refuge in Utah, but is likely more common in similar habitats throughout the interior western U.S. At Zion, a stand was described from a colluvial slope below a sandstone cliff in sandy soil derived from sandstone residuum. Whereas at Ouray it was described from sand dunes on slopes below the bluff along the river and on sand sheets in flatter areas. Sites are generally gentle to moderately sloping, but range from flat to steep and may occur on any aspect. The vegetation is characterized by a typically sparse short-shrub layer 5-20% cover (but may range up to 30% cover) that is dominated by *Ericameria nauseosa* (at least half the cover). Other shrubs or dwarf-shrubs may include *Artemisia dracunculus, Atriplex canescens, Chrysothamnus viscidiflorus, Ephedra torreyana, Eriogonum corymbosum, Ipomopsis congesta, Gutierrezia sarothrae, Opuntia polyacantha,* or *Yucca elata var. utahensis.* The herbaceous layer is generally sparse and is dominated by perennial graminoids such as *Achnatherum hymenoides, Aristida purpurea, Hesperostipa comata,* and *Sporobolus cryptandrus.* Forb cover is sparse.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Not Applicable

Zion National Park Environment: This association was sampled at 6300 feet on a steep southwest-facing, colluvial slope below a sandstone wall. Soils are sandy. It has also been observed throughout the park on other naturally disturbed and human-caused disturbed sites, such as road cuts.

Global Environment: This association has only been described from Zion National Park and Ouray National Wildlife Refuge in Utah, but is likely more common in similar habitats throughout the interior western U.S. Elevation ranges from 1430-1920 m (4700-6300 feet). At Zion, a stand was described from a colluvial slope below a sandstone cliff in sandy soil derived from sandstone residuum. Whereas at Ouray it was described from sand dunes on slopes below the bluff along the river and on sand sheets in flatter areas (Von Loh et al. 2002). Sites are generally gentle to moderately sloping, but range from flat to steep and may occur on any aspect.

VEGETATION DESCRIPTION

Zion National Park Vegetation: Total vegetation cover at this site is only 25%. *Ericameria nauseosa* is the dominant shrub. Other shrubs present are *Ipomopsis congesta, Eriogonum corymbosum, Yucca elata var. utahensis*, and *Atriplex canescens*. Herbaceous species are extremely sparse and contribute minimal cover.

Global Vegetation: This association is characterized by a typically sparse short-shrub layer 5-20% cover (but may range up to 30% cover) that is dominated by *Ericameria nauseosa* (at least half the cover). Other shrubs or dwarf-shrubs may include *Artemisia dracunculus, Atriplex canescens, Chrysothamnus viscidiflorus, Ephedra torreyana, Eriogonum corymbosum, Ipomopsis congesta, Gutierrezia sarothrae, Opuntia polyacantha,* or *Yucca elata var. utahensis.* The herbaceous layer is generally sparse and is dominated by perennial graminoids such as *Achnatherum hymenoides, Aristida purpurea, Hesperostipa comata,* and *Sporobolus cryptandrus.* Forbs associates may include *Chamaesyce glyptosperma, Cirsium* spp., *Heterotheca villosa, Penstemon palmeri, Phacelia heterophylla,* and *Sophora stenophylla.*

Global Dynamics: The sandy substrate is an important environmental variable whether created by active eolian processes or from sandstone residuum.

MOST ABUNDANT SPECIES

Zion National Park

Stratum	Species
SHRUB	*Ericameria nauseosa*

Global

Stratum	Species
SHRUB	*Ericameria nauseosa, Atriplex canescens, Chrysothamnus viscidiflorus, Ephedra torreyana, Gutierrezia sarothrae, Opuntia polyacantha*
GRAMINOID	*Achnatherum hymenoides, Aristida purpurea, Hesperostipa comata, Sporobolus cryptandrus*
FORB	*Heterotheca villosa*, *Sophora stenophylla*

CHARACTERISTIC SPECIES

Zion National Park

Stratum	Species
SHRUB	*Atriplex canescens, Ericameria nauseosa, Eriogonum corymbosum, Ipomopsis congesta, Yucca elata var utahensis*
GRAMINOID	*Achnatherum hymenoides, Hesperostipa comata*
FORB	*Heterotheca villosa, Penstemon palmeri, Phacelia heterophylla, Cirsium* spp.

Global

Stratum	Species
SHRUB	*Ericameria nauseosa, Chrysothamnus viscidiflorus*
GRAMINOID	*Achnatherum hymenoides, Hesperostipa comata, Sporobolus cryptandrus*

GLOBAL SIMILAR ASSOCIATIONS:
Information not available.

GLOBAL STATUS AND CLASSIFICATION COMMENTS

Global Conservation Status Rank: G?.

Global Comments: This association has been described from only 2 areas but is likely more common.

ELEMENT DISTRIBUTION

Zion National Park Range: This association was sampled on a slope in the Middle Fork of Taylor Creek drainage high above the canyon floor. It occurs occasionally throughout the park.

Global Range: This association has only been described from Zion National Park and Ouray National Wildlife Refuge in Utah, but is likely more common in similar habitats throughout the interior western U.S.

Nations: US
States/Provinces: UT

ELEMENT SOURCES

Zion National Park Inventory Notes: Plots: 36 & multiple AA points
Classification Confidence: 3 **Identifier:** CEGL002980
REFERENCES: Von Loh et al. 2002

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